# Clark University,
# in the City of Worcester,
# Massachusetts.

# Register and Ninth Official Announcement.

1897-1900.

Learning and Labor.
LIBRARY
OF THE
University of Illinois.
CLASS. BOOK. VOLUME.
C C549H 1895-1900
Accession No. .....

Digitized by the Internet Archive
in 2012 with funding from
University of Illinois Urbana-Champaign

http://archive.org/details/registeroffici9500clar

LH 22
.42

# CLARK UNIVERSITY,

WORCESTER, MASS.

---

# REGISTER

AND

## Eighth Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
April, 1896.

## CALENDAR: 1896-97.

1896.

JUNE 18. Thursday. Present academic year ends.

OCT. 1. Thursday. Eighth academic year begins.

DEC. 24. Thursday. } Christmas Recess.
1897.
JAN. 4. Monday. }

APR. 5. Monday. } Spring Recess.
– 10. Saturday. }

JUNE 17. Thursday. Eighth academic year closes.

# MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880-81; Professor of Psychology, Johns Hopkins University, 1881-88; LL. D., University of Michigan, 1888, and Williams College, 1889; Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874-75; Tutor of Mathematics, Harvard University, 1875-76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888-89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889-91; Instructor in Biology, University of Wisconsin, 1891-92.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Assistant Professor of Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology, Johns Hopkins University, 1888.

HENRY TABER, PH. D., 9 Oread Place.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888, and Assistant in Mathematics, Johns Hopkins University, 1888-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Assistant Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885-86; Parker Fellow, 1886-89; Student, Universities of Berlin, Paris, Stockholm, 1886-90; Ph. D., Berlin, 1890; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Instructor in Pedagogy.

A. B., with honors in Philosophy, Harvard University, 1882; Instructor in Wittenberg College, 1882-83: Instructor in the State Normal School, Potsdam, N. Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89.

ALEXANDER F. CHAMBERLAIN, PH. D., 10 Beaver St.
Lecturer in Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto. 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in German in University College, and the University of Toronto, 1888-92; Examiner in Modern Languages in the University of Trinity College, Toronto, 1890-91; Examiner in French and German, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92, and Lecturer in Anthropology, 1892; Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Fellow of the American Association for the Advancement of Science.

JOSEPH DE PEROTT, 15 Florence St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., Philadelphia, Pa.,
Docent in Pedagogy. 70 Florence St.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95.

ADOLF MEYER, M. D., Worcester Lunatic Hospital.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91: Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95; Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

ARTHUR ALLIN, PH. D., Utica, Ont., Canada,
Honorary Fellow in Philosophy. 6 Wyman St.

A. B., Victoria University, Toronto, (Double Gold Medalist in Classics and Philosophy) 1892; University of Heidelberg, 1892; University of Breslau, 1892-93; Ph. D., Berlin University, 1895.

HENRY R. BAKER, M. A., B. D., Washta, Ia.,
Fellow in Psychology. 70 Florence St.

A. B., Iowa College, 1882; A. M., 1885; B. D., Yale University, 1889; Congregational Ministry, 1887; Graduate Student in Philosophy, Harvard University, 1890-91; Student in Psychology, Clark University, 1894-95.

WILLIAM P. BOYNTON, A. M., Los Angeles, Cal.,
Fellow in Physics. 58 Woodland St.

A. B., Dartmouth, 1890; A. M., 1893; Professor of Physics and Chemistry, University of Southern California, 1890-93; Graduate Scholar and Assistant in Physics, Dartmouth College, 1893-94; Scholar in Physics, Clark University, 1894-95.

H. S. CURTIS, B. A., Olivet, Mich.,
Fellow in Psychology. 5 Gates St.

B. A., Olivet College, 1894; B. A., Yale University, 1895, (with honors in philosophy).

SCHUYLER C. DAVISSON, A. M., Bloomington, Ind.,
Fellow in Mathematics. 4 Charlotte St.

A. B., Indiana University, 1890, and A. M., 1892; Instructor in Mathematics, Indiana University, 1890-93, and Associate Professor since 1893.

GEO. E. DAWSON, A. B., Ann Arbor, Mich.,
Fellow in Psychology. 6 Gates St.

A. B., University of Michigan, 1887; Teacher of Greek and English Literature, Carleton Institute, (Mo.) 1887-88; Student, University of Leipzig, 1888-89; Principal, Oil City (Pa.)High School, 1889-91; Professor of English and Literature, State Agricultural and Mechanical College, So. Dakota, 1891-93; Instructor in English, University of Michigan, 1893-95.

THOMAS WILLIAM EDMONDSON, B. A., Philadelphia, Pa.,
Fellow in Physics. 75 Florence St.

B. A., London, Eng., 1888 (First in Honors and Senior Exhibitioner at London Matriculation, June, 1886); Akroyd Scholar, 1889-90; Senior Mathematical Scholar, Pembroke College, Cambridge, Eng., 1889-91; 18th Wrangler in Mathematical Tripos, Cambridge, 1891; B. A., Cambridge, 1891; Post-Graduate Student in Chemistry, Physics and Botany, Cambridge, 1891; Assistant Tutor in Mathematics and Physics, University Correspondence College, Cambridge, 1889-92; First Class in Intermediate Science Examination, London, 1892; Fellow in Physics, Clark University, 1894-95.

ALEXANDER CASWELL ELLIS, A. B., Louisburg, N. C.,
Fellow in Psychology. 84 Woodland St.

A. B., University of North Carolina, 1894; Student in Summer School of Physical Culture, Harvard University, 1894; Head Master, Classical High School, Chapel Hill, N. C., 1891-92; Scholar in Pedagogy, Clark University, 1894-95.

FREDERICK C. FERRY, A. M., Saratoga Springs, N. Y.,
Fellow in Mathematics. 11 Freeland St.

A. B., Williams College, 1891; Instructor, Latin and Mathematics, Williams College, 1891-94; A. M., Williams College, 1894; Graduate Student in Mathematics, Harvard University, 1894-95; A. M., Harvard University, 1895.

R. R. GURLEY, M. D., M. S., Washington, D. C.
Fellow in Biology. 4 Barbour St.

M. D. (with honors), Med. Dept. Columbian Univ., Washington, D. C.; Scientific Assistant, Dept. Invertebrate Palæontology, U. S. National Museum, 1886-90; Scientific Assistant U. S. Fish Commission, 1890-95; Assistant Palæontologist, U. S. Geological Survey, 1895; M. S., Graduate School, Columbian University, Washington, D. C., 1895.

D. D. HUGH, A. M., Murray Harbor, P. E. I.,
Fellow in Psychology. 58 Woodland St.

A. B., Dalhousie College, 1891; A. B., Harvard University, 1892; A. M., Cornell University, 1893; Student in Education, 1893-95.

J. P. HYLAN, Concord, N. H.,
Fellow in Psychology. 925 Main St.

Student, Harvard University, 1891-95.

F. C. KENYON, PH. D., 974 Main St.
Fellow in Biology.

B. Sc., University of Nebraska, 1892; Instructor in Zoölogy, University of Nebraska, 1891-93; Assistant and Fellow in Biology, Tufts College, 1893-95; A. M. and Ph. D., Tufts College, 1895.

ERNEST H. LINDLEY, A. M., Bloomington, Ind.,
Fellow in Psychology. 9 Maywood St.

A. B., Indiana University, 1893; and A. M., 1894; Instructor in Philosophy, Indiana University, 1893-95.

JAMES H. LEUBA, PH. D., 21½ Benefit St.

B. S., Neuchatel, Switzerland, 1886; Ph. B., Ursinus College, Pa., 1888; Teacher of the French Language, St. Mark's School, Southboro, Mass., 1891-92; Scholar in Psychology, Clark University, 1892-93; Fellow, 1893-95; Ph. D., Clark University, 1896.

E. W. RETTGER, A. B., Huntingburg, Ind.,
Fellow in Mathematics. 70 Florence St.

Graduate Indiana State Normal School, 1891; A. B., Indiana University, 1893; Principal, Rensselaer (Ind.) High School, 1893-94; Instructor in Mathematics, Indiana University, 1894-95.

*S. EDWARD RYERSON, M. A., Orillia, Ont., Canada,
Fellow in Mathematics. 4 Charlotte St.

M. A., Queen's University, 1895.

COLIN ALEXANDER SCOTT, B. A., 12 Columbus St.
Fellow in Pyschology.

Student, College of the City of New York, 1877-78; B. A., Queen's University, Kingston, Ont.; Gold Medallist, with honors in Chemistry, Biology and Geology, 1885; Graduate, Toronto Normal School, 1879; Director of Instruction in drawing, Kingston High and Public Schools, 1883-84; Instructor in Chemistry, Ladies' Medical College, Kingston, 1886; Science Master, Ingersoll College Institute, 1887; Science Master, Ottawa College Institute, 1887-94; Fellow in Psychology, Clark University, 1894-95; University and Departmental Associate Examiner, 1893-94; Delegate to Royal Canadian Society, 1894; Exhibitor at Royal Canadian Academy and Boston Art Club; Advanced certificate from Ontario School of Art, 1886.

BENJAMIN F. SHARPE, A. M., 1018 Main St.
Fellow in Physics.

A. B., Wesleyan University, Middletown, Conn., 1887, and A. M., 1890; Adjunct Professor of Physics and Biology, Randolph-Macon College, Ashland, Va., 1887-91; Graduate Student and Scholar, Johns Hopkins University, 1891-94; Fellow in Physics, Clark University, 1894-95.

*Died March 25, 1896.

JAMES R. SLONAKER, B. S., Farmland, Ind.,
Fellow in Biology. 2 Hancock St.

Graduate, Indiana State Normal School, 1889; Supervising Principal of Schools, Elroy, Wis., 1889-91; B. S., University of Wisconsin, 1893; Fellow in Biology, Clark University, 1893-95.

EDWIN E. STARBUCK, A. M., Bridgeport, Ind.,
Fellow in Psychology. 925 Main St.

A. B., Indiana University, 1890; A. B., Harvard University, 1894, and A. M., 1895; Teacher of Mathematics and Latin, Spiceland (Ind.) Academy, 1890-91; Teacher of Mathematics, Vincennes (Ind.) College, 1891-93; Student in Psychology, Harvard University, 1893-95.

COLIN C. STEWART, B. A., Toronto, Canada,
Fellow in Physiology. 84 Woodland St.

B. A., University of Toronto, 1894; Scholar in Physiology, Clark University, 1894-95.

S. N. TAYLOR, PH. B., Farmingdale, N. Y.,
Fellow in Physics. 67 Florence St.

Ph. B., Wesleyan University, Middletown, Conn., 1887; in Charge of Experimental Laboratory, Thomson-Houston Electric Works, Lynn, Mass., 1887-91; Professor of Natural Sciences, Maine Wesleyan Seminary and Female College, 1891-93; Fellow in Physics, Clark University, 1893-95.

ALBERT P. WILLS, B. E. E., Waltham, Mass.,
Fellow in Physics. 75 Florence St.

B. E. E., Tufts College, 1894 (with honors in Electricity); Scholar in Physics, Clark University, 1894-95.

N. P. AVERY, A. B., Holyoke, Mass.,
Scholar in Psychology. 887 Main St.

A. B., Amherst College, 1891; Principal, Yates Academy, Chittenango, N. Y., 1891-95.

E. W. BOHANNON, A. M., Boonville, Ind.,
Scholar in Pedagogy. 4 Charlotte St.

Graduate, Ind. State Normal School, 1887; Supt. of Schools, Brownsburg, Ind. 1887-88; A. B., Indiana University, 1890; Supt. of Schools, Plainfield, Ind., 1889-91; Principal High School, Pekin, Ill., 1891-92; A. M., Indiana University, 1892; Supt. of Schools, Rensselaer, Ind., 1892-95.

WARREN G. BULLARD, A. B., Geneva, N. Y.,
Scholar in Mathematics. 14 Crystal St.

A. B., (with honors in Mathematics), Brown University, 1892; Instructor in Mathematics in Elmira Free Academy, Elmira, N. Y., 1892-93; Scholar in Mathematics, Clark University, Oct.-1893-Feb., 1894; Instructor in Mathematics and Jurisprudence, St. Lawrence University, Canton, N. Y., Feb.-June, 1894; Scholar in Mathematics, Clark University, 1894-95.

T. R. CROSWELL, A. B., Farmington Falls, Me.,
Scholar in Pedagogy. 5 Gates St.

A. B., Bowdoin College, 1891; Principal, Wilton Academy, 1891-94; Student in Pedagogy, Columbia College, 1894-95.

JOHN S. FRENCH, A. B., Norway, Me.,
Scholar in Mathematics. 4 Charlotte St.

A. B., Bowdoin College, 1895.

CEPHAS GUILLET, A. B., Cobourg, Ont., Canada,
Scholar in Psychology. 5 May St.

A. B., Victoria University, Cobourg (with honors in English, French and German Literature), 1887; Modern Language Master, Perth, Ont., 1887-90; Modern Language Master, Ottawa, Ont., 1890-94; Student at Law, Osgood Hall, Toronto, 1894-95. Examiner in English and French, Victoria University, 1888-89; Associate Examiner in French and German, Ontario Dept. of Education, 1891-94; Examiner in French, Toronto University, 1893-95.

ELLSWORTH GAGE LANCASTER, M. A., B. D., Eureka, Kan.,
Scholar in Psychology. 56 Hollywood St.

B. A., Amherst College, 1885, and M. A., 1888; Teacher Elocution and Physical Culture, Williston Seminary, Easthampton, Mass., 1885-86; Student, Auburn Theological Seminary, 1886-87; Teacher Physical Culture, Latin and German, Morgan Park Military Academy, also Student Chicago Baptist Seminary, 1887-88; Andover Theological Seminary, 1888-89; B. D., Andover, 1889; Pastor Congregational Church, Ashby, Mass., 1889-90; Principal Southern Kansas Academy, 1890-95.

DANIEL EDWARD PHILLIPS, A. M., Athens, Ga.,
Honorary Scholar in Psychology. 925 Main St.

Graduate, West Virginia State Normal School, 1890; Principal, Public Schools, Philippi, W. Va., 1890-91; A. B., University of Nashville, 1892; A. M., 1894; Institute Instructor in W. Va., summers of 1892-94; Scholar in Psychology, Clark University, 1894-95; Teacher of Pedagogy, Normal Department, University of Ga., since March, 1895.

JOHN C. SHAW, M. S., Kasson, W. Va.,
Scholar in Pedagogy. 5 Gates St.

Graduate State Normal School, Fairmont, W. Va., 1889; Principal Graded Schools, Paw Paw, W. Va., 1889-90; B. S., University of Nashville, 1892; Peabody Normal College, Nashville, Tenn., 1893; M. S., University of Nashville, 1894; Teacher of Mathematics, Marshall College, Marshall, Ark., 1894-95.

MAURICE H. SMALL, A. B., Westbrook, Me.,
Scholar in Psychology and Pedagogy. 4 Charlotte St.

A. B., Colby University, 1887; Principal, Norway High School, Norway, Me., 1887-92; Principal, Westbrook High School, Westbrook, Me., 1892-95.

HUGH A. SNEPP. A. B., Miamisburg, O.,
Scholar in Mathematics. 70 Florence St.

A. B., Heidelberg College, 1893; Principal, Germantown (O.) High School, 1893-94; Tutor in Mathematics, Heidelberg College, 1894-95.

J. RICHARD STREET, A. M., Palmyra, Ont., Canada,
Scholar in Pedagogy. 49 Hollywood St.

A. B., Victoria University, 1884, and A. M., 1888; Modern Language Master, Smithville High School, 1885-86, and Walkerton High School, 1886-87; Principal, Caledonia High School, 1887-95.

JONATHAN I. BUCK, A. M., Webster, Mass.,
Special Student in Pedagogy.

A. B., Dartmouth College, 1889, and A. M., 1892; Principal, High School, Hanover, N. H., 1889-92; Superintendent of Schools, and Principal of High School, Warren, Mass., 1892-93; Superintendent of Schools, and Principal of High School, Webster, Mass., since 1893.

HAROLD M. DEAN, A. B., Webster, Mass.,
Special Student in Pedagogy.

A. B., University of Vermont, 1890; Principal, Grammar School, Palmer, Mass., 1892-94; Sub-master, High School, Webster, Mass., since 1894.

WILLIAM A. HOYT, A. M., North Brookfield, Mass.,
Special Student in Pedagogy.

B. A., Bates College, 1880, and A. M., 1884; Principal of High School, Rockport, Me., 1881-82; Principal of Greely Institute, Cumberland, Me., 1882-83; Cornwall Heights School, Cornwall, N. Y., 1883-86; Principal of High School, Medway, Mass., 1886-88; North Brookfield, Mass., 1888-92; Augusta, Me., 1892-93; Student in Pedagogy, Clark University, 1893-94; Superintendent of Schools, Brookfield District (North Brookfield and Brookfield), Mass., since May, 1894; Special Student in Pedagogy, Clark University, 1894-95.

GEORGE EVERETT PARTRIDGE, Worcester, Mass.,
Special Student in Philosophy. 54 Hollywood St.

T. RICHARD PEEDE, 10 Silver St.
Special Student in Philosophy and Pedagogy.

Pastor South Baptist Church, Worcester, Mass.

J. ASBURY PITMAN, Oakdale, Mass.,
Special Student in Pedagogy.

Graduate, State Normal School, Castine, Me., 1887; Principal, High School, Searsport, Me., 1888-89: Principal, High School, Jefferson, Me., 1889-90; Principal of Schools, Millbury, Mass., 1890-91; Principal of Schools, Malden, Mass., 1891-92; Superintendent of Schools, West Boylston District, since June, 1892.

LOUIS N. WILSON, 11 Shirley St.
Librarian and Clerk of the University.

# ADMINISTRATION.

The Trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively, through the three committees named below, and also through the President of the University.

## BOARD OF TRUSTEES.

JONAS G. CLARK,

STEPHEN SALISBURY, JOHN D. WASHBURN,
GEORGE F. HOAR, FRANK P. GOULDING,
WILLIAM W. RICE,* GEORGE SWAN,
EDWARD COWLES, THOMAS H. GAGE.

## OFFICERS.

| | |
|---|---|
| President, - - - | JONAS G. CLARK. |
| Vice-Presidents, - - | GEORGE F. HOAR, WILLIAM W. RICE.* |
| Treasurer, - - - | THOMAS H. GAGE. |
| Secretary, - - - | FRANK P. GOULDING. |

## COMMITTEES.

*Finance.*

JONAS G. CLARK, STEPHEN SALISBURY,
JOHN D. WASHBURN, THOMAS H. GAGE.

*Buildings.*

JONAS G. CLARK, JOHN D. WASHBURN.

*By-Laws.*

JONAS G. CLARK,

WILLIAM W. RICE,* STEPHEN SALISBURY,
JOHN D. WASHBURN, GEORGE SWAN.

*Deceased March 1, 1896.

### President.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees, shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent, or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the corporation, September 26, 1889.

## FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

### I. University Senate.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

### II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

### III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangement, cataloguing and use of books and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

# GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:


| | | |
|---|---|---|
| I. | MATHEMATICS. | (Page 26) |
| II. | PHYSICS. | ( " 35) |
| III. | CHEMISTRY. | ( " 43) |
| IV. | BIOLOGY. | ( " 44) |
| V. | PSYCHOLOGY. | ( " 52) |


In addition to these *Education* is now a sub-department. (Page 61.)

## ADMISSION.

Only graduate students are admitted, or those of equivalent attainments, unless in rare and special cases. At present no entrance examinations are required, but by testimonials, diplomas, personal interviews or written specimens of work, the authorities must be satisfied that the applicant has scholarship enough to work to advantage, and zeal and ability enough to devote himself to his chosen field. The methods of the University

are too costly, and its energy and funds too precious, to be spent upon men who are not well trained, promising, and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges, and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief as well as the best work of this University is individual, and involves daily suggestion, encouragement and direction.

### Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits his power in teaching. This and the custom of instructors of attending each other's lectures, add interest and efficiency to the work of the University.

## I. Docents.

The highest annual appointment is that of Docent. These positions are primarily honors, and are reserved for a few men whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their department, their time will be mainly reserved for study and research in a way best adapted to qualify them still more fully for academic advancement.

These positions are now official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can now be furnished on application and which requires a memoir or essay representing original work in their own department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability, and so far as this diploma can have the significance of a

title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that by the existence of such a select body of men of guaranteed scientific training, ability and approved power to teach, the difficulties under which college trustees sometimes succumb in selecting suitable men for their professors may be diminished, and that otherwise this new grade will aid in raising standards of academic scholarship in colleges and in encouraging scientific research here. Good men of this class may be paid a salary.

## II. Candidates for the Degree of Doctor of Philosophy.

In most cases it is probable that three, or at least two, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time when, in the judgment of the University authorities, the candidate is prepared. A pre-arranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a thesis upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be reported on in writing by the chief instructor, printed at the

expense of the candidate, and at least one hundred copies given to the University. In case, however, of theses of very unusual length, or containing very expensive plates, the academic Senate shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty. Each of these copies shall bear upon it in print the statement of the chief instructor that it is a thesis for the Doctor's degree in his department at Clark University.

Such formal or informal tests as the academic Senate shall determine, shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede by not less than six months and not more than one year the examination itself, and the nature and result of this test shall be made matter of record.

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the thesis must be in the hands of the Librarian before the diploma is given. In exceptional cases, however, and by special action of the Senate, the ceremony of promotion may precede the presentation of the printed copies of the

thesis. The latter, however, must always precede the actual presentation of the diploma.

An oral but not a written examination is required upon at least one minor subject in addition to the major, before an examination jury, composed of at least four members, including the head of the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examination to the Senate, who, if they are also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard requirements for it be kept the highest practicable, that it be reserved for men of superior ability and attainment only, and that its value here be never suffered to depreciate.

It is to the needs of these students that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are pri-

marily intended, although any of these honors may be awarded to others.

### III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the University, may also be received. This class includes those who may desire to devote themselves exclusively to one or more of the special branches—mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to matriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners, in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

### IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes, who are nearly, if not quite, qualified to become candidates for the degree of Doctor of Philosophy, may also be received.

Students of this class must for the present have completed the work of the first three years of a regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their attainments, and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

### Fellowships and Scholarships.

The sum of $4,800 is now devoted to Fellowships. This may provide for eight Senior Fellowships at $400 each, and eight Junior Fellowships at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 is also remitted, thus making the value of these Fellowships $600 and $400 each respectively.

Besides these, sixteen other appointments,

viz: eight Senior University Scholarships which remit all the fee and eight Junior University Scholarships remitting one-half the fee, have been provided. These sixteen Scholarships have thus a value of $200 each to Senior and $100 each to Junior Scholars.

The total value of all these appointments is thus $10,400.

The founder of the University and his wife unite with the Trustees and President in inviting sympathy and practical coöperation in the multiplication of such aids, large or small, temporary or permanent, here at the outset.

### A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

### The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

## Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three learned professions, although the latter are not excluded.

Applications should state the candidate's course of study and be accompanied by testimonials or diplomas ; should indicate a decided preference for some special department, and, if possible, be accompanied by some specimen of his work for the aid of the Board of Selection. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during the year. The names of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the en-

tire academic year and devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must coöperate in promoting harmony, order and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Because intended primarily as honors, both Fellowships and Scholarships are awarded without reference to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

## METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each in-

structor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus and reference to standard text-books, and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will from time to time be given.

SEMINARIES. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded, and the efficiency of universities has been greatly increased.

LABORATORY WORK. For beginners this was from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators are tested, methods discussed and perfected, with a view to developing that independence in research which is the consummation of scientific culture.

## NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $200 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will, so far as possible, be informed upon any of these or other points, in advance of official announcement, upon addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendance to its close.

The following are the statements and announcements of the departments for the current year, 1896-7 : —

# I.

## MATHEMATICS.

### Programme for 1896–97.

### INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is

given by means of introductory, advanced, and special courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

*Group* A:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Theory of Functions of Real and Imaginary Variables and Definite Integrals; 3 hours a week, through the year.

Theory of Numbers; 2 hours a week, first half-year.

Modern Synthetic Geometry; 2 hours a week, second half-year.

*Group* B:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Elliptic Functions, Differential Equations, and Calculus of Variations; 3 hours a week, through the year.

Algebraic Substitutions and their Applications to the Theory of Equations; 2 hours a week, first half-year.

Analytic Geometry of Higher Surfaces and Twisted Curves; 2 hours a week, second half-year.

Algebraic Invariants; 2 hours a week, first half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the

present day. Thus, for example, the conic sections and quadric surfaces are treated by modern methods from the beginning, with adequate consideration of the discoveries of the great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

*Special advanced courses*, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the degree of Doctor of Philosophy.

---

For the academic year 1896–97, the following courses are offered:

BY PROFESSOR STORY.

Advanced courses:

THEORY OF ERRORS AND THE METHOD OF LEAST SQUARES; 2 hours a week, first half-year.

APPLICATIONS OF THE INFINITESIMAL CALCULUS TO THE THEORY OF SURFACES; 3 hours a week, second half-year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory courses:

MODERN SYNTHETIC GEOMETRY; 2 hours a week, second half-year.

ANALYTIC GEOMETRY OF HIGHER SURFACES AND TWISTED CURVES; 3 hours a week, first half-year.

BY ASSISTANT PROFESSOR TABER.

Introductory courses:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

THEORY OF FUNCTIONS OF REAL AND IMAGINARY VARIABLES, and DEFINITE INTEGRALS; 3 hours a week, through the year.

SEMINARY in connection with these introductory courses; through the year.

BY M. DE PERROTT.

Introductory course:

THEORY OF NUMBERS; 2 hours a week, first half-year.

Advanced course:

RIEMANN'S SURFACES AND ABELIAN INTEGRALS; 2 hours a week, second half-year.

During the academic years 1889–96, advanced and special courses have been given in:

1. THE HISTORY OF ARITHMETIC AND ALGEBRA among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.

3. Linear Transformations and Algebraic Invariants, with applications to algebraic equations and geometry.

4. Theory of Substitutions, with applications to algebraic equations.

5. Plane Analytic Geometry.

6. Solid Analytic Geometry.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass' Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general the-

ory of linear differential equations, Gauss', Legendre's and Bessel's functions.

30. PARTIAL DIFFERENTIAL EQUATIONS, including Laplace's Bessel's, and Lamé's functions.

31. FINITE DIFFERENCES AND PROBABILITIES..

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors ; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several instructors, and those who have attained the necessary proficiency are personally directed in individual researches,

of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented memoirs embodying the results of original investigations that receive the approval of the head of the department, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University. Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

## MATERIAL FACILITIES.

The library is provided with the more important textbooks, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any considerable extent to mathematics. Among the periodicals of which the library has complete or nearly complete sets are the following :

Abhandlungen der Math.-Phys. Classe der Königl. Sächsischen Gesellschaft der Wissenschaften. Vols. 1-14. Leipzig, 1852–88.

Comptes Rendus. Hebdomadaire des Séances de l'Académie des Sciences. Vols. 1-122 with 3 registers. Paris, 1835–96.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892–95.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 1853–88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798–1896.

Transactions of the Philosophical Society of Cambridge. 1822–94. 15 vols.

Philosophical Transactions of the Royal Society. London, 1665–1887. 179 vols. (Continuation in Green Library.)

Proceedings of the Cambridge Philosophical Society. Vols. 1–8. 1843–95.

Proceedings of the Royal Society of London. Vols. 1–59. 1800–96.

Acta Mathematica. Vols. 1–20. Stockholm, Berlin and Paris. 1882–96.

American Journal of Mathematics. Vols. 1–18, with index to vols. 1–10. Baltimore, 1878–96.

Annales scientifiques de l'Ecole Normale Supérieure. Series I, vols. 1–7; series II, vols. 1–12: series III, vols. 1–12. Paris, 1864–95.

Bulletin des Sciences Mathématiques (Darboux, etc.). Series I, vols. 1–11; series II, vols. 1–20. Paris, 1870–96.

Bulletin de la Société Mathématique de France. Vols. 1–23. Paris, 1873–96.

Jahrbuch über die Fortschritte der Mathematik. Vols. 1–25. Berlin, 1868–96.

Journal de l'Ecole Polytechnique, etc. Nos. 1–64. Paris, 1794–1894 (in 93 vols.).

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Series I, vols. 1–20; series II, vols, 1–19; series III, vols. 1–10; series IV, vols. 1–10; series V, vol. 1. Paris, 1836–95, with registers to series I, vols. 1–15.

Journal für reine und angewandte Mathematik (Crelle, etc.). Vols, 1–116 with register to vols. 1–100. Berlin, 1826–96.

Mathematische Annalen (Clebsch, etc.). Vols. 1–47. Leipzig, 1869–96.

The Oxford, Cambridge and Dublin Messenger of Mathematics. Series I, vols. 1–5; series II, vols. 1–19. London and Cambridge, 1862–90.

Nouvelles Annales de Mathématiques. Series I, vols. 1–20; series II, vols. 1–20; series III, vols. 1–10. Paris, 1842–91.

Proceedings of the London Mathematical Society. Vols. 1–20. London, 1865–89.

Quarterly Journal of Mathematics, pure and applied. Vols. 1–28. London, 1857–96.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Vols. 34–41. Leipzig, 1888–96.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread-models of developable surfaces.

The department possesses also :

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

# II.

## PHYSICS.

This department is under the direction of Assistant Professor Arthur G. Webster, Ph. D., who will regularly deliver, with a period of two years, the following cycle of courses:

1. Dynamics.—General Methods, Canonical Equations, Systems of Particles, Rigid Bodies.

2. Newtonian and Logarithmic Potential Function. Attraction of Ellipsoids.

3. Elasticity, Hydrodynamics, Wave Motion, Dynamical Basis of Sound and Light.

3 a. Dynamics of Cyclic and Oscillatory Systems, with Applications to Theory of Electricity, Sound and Light.

4. Electricity and Magnetism.

5. Optics, Physical and Geometrical.—Elastic and Electromagnetic Wave-theories.

6. Thermodynamics, Thermo- and Electro-Chemistry, Kinetic Theory of Gases.

7. The Partial Differential Equations of Mathematical Physics.

Laplace's Equation, Equation of Thermal and Electrical Conduction, Equation of Wave Motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's, Bessel's, and Lamé's Functions.

The courses for the year 1896–7 will be 1, 2, 3 and 4.

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there will be held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals. Besides the above regular courses, advanced courses will, from time to time, be given on such subjects as the Figure of the Earth, Theory of Tides, and Theory of Sound.

The aim of the department is to ensure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put to work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will at all times have the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of

lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches, and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance, may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat, the steady flow of electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, so far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical

preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the Calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivatives, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation, may be recommended to the student Greenhill's, Williamson's, or Byerly's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus' Determinants.

### Requirements for the Doctor's Degree.

1. The ability to read at sight specimens of scientific French and German, tested six months before the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics, and upon the subjects named above in Theoretical Physics, as a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the Physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfillment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather

than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment to science to encourage research in new fields by immature and ill-prepared minds and hands.

## Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall; Dr. Webster's drop chronograph, and the standard condenser and other apparatus used in determining "*v*."

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it are at present placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires, with the motor and blower used in driving it, and the governor to the high-speed chronograph, which latter stands on a pier in room B. In room B are two piers standing in front of the windows, and designed for spectroscopic work. The room C contains the astronomical clock and balances, and is also used for electrical work. The room E is fitted up as a general workshop, and contains a lathe, planer, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery. The further end is used as a carpenter shop for pattern-making, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at

present used for optical work. The next room contains cases for the apparatus when not in use, together with a store-room at one end. The third room is the lecture room, and is adorned with Rowland's great spectrum map. Special mention should be made of the work-shop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied from a ten-horse power Armington & Sims engine with independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided.

## The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M., and any number of books may be taken out by any person, and kept ten days. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though small, is carefully selected, and while the number of volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may be fairly said to contain the best works. Among others may perhaps be mentioned:

*Collected Writings* of Helmholtz, Kirchhoff, Thomson, Green, Joule, Stokes, Gauss, Fourier, Laplace.

*Potential, Electricity and Magnetism.* — Riemann, Betti, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Mascart and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

*Elasticity.*—Mathieu, Ibbetson, Love, Todhunter and Pearson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

*Hydrodynamics.*—Bassett, Lamb, Kirchhoff, Neumann, Poincaré.

*Light.* — Mascart, Kirchhoff, Neumann, Volkman, Résal, Poincaré, Bassett, Preston.

*Heat.*—Clausius, Rühlman, Boltzmann, Bertrand, Zeuner, Poincaré, Preston.

*Sound.*—Rayleigh, Donkin.

A large number of treatises on Mechanics and a set of the Mémoires et Travaux du Comité International de Poids et Mesures may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.
Proceedings Royal Society.
Philosophical Magazine.
Physical Review.
Nature.

The library subscribes to the following journals:

American Journal of Science.
Philosophical Magazine.
Proceedings Royal Society.
Physical Review.
Electrician.
Electrical World.
Nature.
Science.

Annalen der Physik u. Chemie.
Beiblätter do.
Zeitschrift für Instrumentenkunde.
Journal de Physique.
Comptes Rendus.

## III.

## CHEMISTRY.

No courses will be offered in this department during the year 1896–97.

## IV

## BIOLOGY.

### Programme of Work for Year 1896–97.

Dr. Hodge will offer the following courses:

I. Comparative Study of Nervous Systems and Sense Organs.—The point of view of this course will be both anatomical and physiological. It is intended to begin with a study, as far as possible comparative, of the structural elements of the nervous system in both invertebrates and vertebrates. Following this, it is proposed to consider the structure and functions of the nervous system in a series of animals, beginning with the cœlenterata and ascending through the molusca, vermes, tunicata, arthropoda and vertebrates. The course will be illustrated, so far as possible, by diagrams, models, dissections and experiments. One lecture weekly, October to January.

II. General Biology.—This course is intended to give in general outline the fundamental principles of biological science. The most general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organisms. The topics: *Methods and aims of biological research*, *origin of living matter organization*, *growth* and *reproduction*, *heredity*, *differentiation* and *evolution* will be given special prominence throughout the course. One lecture weekly. Laboratory work will be arranged to suit the requirements of those taking the course.

In future each of the above courses will be given in extenso during alternate years, course I being given in 1896–97. Course II will be abbreviated to about six lectures during January and February.

The biological seminary will meet one evening weekly throughout the year. During the past year the seminary has devoted

its time to a study of the general history of medicine with special reference to the development of neurology and physiology. It is proposed to devote the greater part of the time the coming year to a study of prominent contemporary workers in physiology, beginning with the work, methods and life of Carl Ludwig. Commencing thus with Leipzig a round of the chief European laboratories will be made, studying the methods of investigation especially prominent in each, together with the professors and their recent work.

## PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations, laboratory work and quizzes in the following lines :

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divisions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1896–97 will be offered as follows :

III. The Physiology of Nutrition. One lecture weekly from

October to April. Demonstrations and laboratory work will be arranged to meet the requirements of students taking the course.

IV. Physiology of the Reproductive Organs. One lecture weekly, April and May.

By way of supplementing the above courses and courses in other departments of the University, two courses have been planned as follows:

V. Embryology and Growth of the Human Brain and Sense Organs.—Six lectures, with demonstrations and literature.

VI. Practical Histology of the Nervous System.—The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

## Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory

is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research, the resources of the department are such that he will be given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and state universities, is sufficient to enable students to begin work here.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own microscopical glass, slides and covers, and must pay the cost price of all glass ware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahrsberichte and Centralblätter greatly facilitates the work of referring to the literature of topics under investigation in the laboratory.

The Journal Club meets weekly, for the purpose of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.
Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.
Jahresberichte über die Fortschritte der Anatomie und Physiologie, 1873–1895, complete.
Jahresberichte über die Fortschritte der reinen Pharmaceutischen und Technischen Chemie, etc., 1847–1887, complete.
Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.
Royal Society Catalogue of Scientific Papers, A-Z.

To the above may be added the four following taken by the Green Library, and accessible to students, viz. :

Centralblatt für die Medicinischen Wissenschaften, complete.
Morphologisches Jahrbuch, complete.
Monatsschrift, International für Anatomie und Histologie.
Schmit's Jahrbücher der in-und ausländischen gesammten Medicin.

---

Abhandlungen der math.-phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.
Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesellschaft der Wissenschaften. Leipzig, 1852-88.
American Journal of Science.
American Naturalist, 1888-96.
Alienist and Neurologist, 1890-96.

Annales de l'Institut Pasteur. Vols. 3-5.
Arbeiten a. d. physiologischen Institut Tübingen.
Archiv für Anatomie und Physiologie, 1796, complete to 1896.
Archiv für Anatomie und Entwickelungsschichte, His and Braune, complete.
Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete, 1847-96.
Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).
Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889-96.
Archiv für Mikroskopische Anatomie. (Complete set in Green Library.)
Archives de Biologie, 1889-96.
Archives Italiennes de Biologie, 1889-96. (Complete set in Green Library.)
Archives de Neurologie, 1890-96.
Archives de Physiologie Normale et Pathologique, 1889-96.
Archives de Zoologie Expérimentale et Générale.
Beiträge zur Anatomie und Physiologie von Eckhard, 1858-88.
Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886-96.
Berichte uber die Leistungen in der Naturgeschichte der Niederen Thiere, 1848-53, 57-60, 61-65, 66-69, 70-71, 72-75, 76-79.
Bibliotheca Zoologica; Taschenberg Lieferungen. 1886-96.
Claus Arbeiten aus dem zoologischen Institut der Universität Wien und der zoologischen Station in Trieste, 1878-96.
Deutsche Zeitschrift für Nervenheilkunde, 1891-96.
Internationale Monatsschrift für Anatomie und Physiologie, 1889-96.
Johns Hopkins Hospital Bulletins, 1890-96.
Journal de l'Anatomie et de la Physiologie, 1889-96.
Journal of the Coll. of Science, Imperial University of Japan, to date.
Journal of the Marine Biological Association of the United Kingdom. Vols. I-III.
Journal of Comparative Neurology, 1891-96.
Journal of Morphology, complete.

Journal of Nervous and Mental Disease, 1890-96.
Journal of Physiology. Vols. X-XVII.
Journal of the Royal Microscopical Society, 1878-96.
Laboratoire d'Histologie du Collège de France, Années 1874, 83-88.
Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k. p., Ak. d. Wissen zu Berlin, 1882-93.
Mind, 1876-96.
Mittheilungen aus der Zoologischen Station zu Neaple, complete, 1879-96.
Nature, 1869-96.
Frorïep, Notizen, 1822-36, in 50 parts; 1837-46, in 40 parts.
Pflüger's Archiv. für die Gesammte Physiologie, complete, 1868-96.
Philosophical Society of Cambridge, Transactions, 1822-95, complete.
Philosophical Transactions of the Royal Society, London, 1665-1887, complete with indexes. (1887-96, in Green Library.)
Popular Science Monthly, 1872-96.
Proceedings of the Cambridge Philosophical Society, 1843-96.
Proceedings of the Royal Society of London, 1800-96.
Quarterly Journal of Microscopical Science, 1889-93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenger.
Revue Scientifique, 1889-96.
Revue des Sciences Médicales en France et à l'Etranger, Hayem, 1889-96.
Revue de Médicine. Vols. IX-XV.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884-96.
Verhandlungen der physiologischen Gesellschaft zu Berlin, 1886-96.
Zeitschrift für Biologie, 1889-96.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche-Medicin, 1888-96.

Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Vols. I–IX (1896), complete.
Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.
Zoölogical Record, 1864-96.
Zeitschrift für wissenschastliche Mikroskopie, 1889-96.

In addition to the above, current numbers of many purely medical journals are taken by the library. Among these may be mentioned: American Annals of the Deaf, American Journal of Insanity, Archives of Pediatrics, Brooklyn Medical Journal, Canadian Practitioner, The Chicago Journal, Medical Record, Medical Times, New York Medical Journal, Pacific Medical Journal, Therapeutic Gazette, The Practitioner, The Satellite, and others.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

## V.

## PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory and Attention. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic below.

IV. Anthropological psychology; Myths, Custom and Belief, Comparative Religion and Psychology of Religion, Primitive Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

V. Æsthetic and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VI. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses.

VII. Applications of psychology; pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sexual problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

The PSYCHOLOGICAL LABORATORY consists of a suite of four rooms on the second floor of the main building, one large and three small. The large room on the second floor is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, and the third as occasion requires. A large room on the third floor is also used for auditory experiments requiring freedom from ordinary noise, and for storing bulky pieces of apparatus.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measurements. Many pieces have been manufactured at the University and a considerable number designed here for special researches. In addition to the more ordinary pieces the following may be mentioned:

Kinesimeter of Hall and Donaldson. Apparatus for the study

of "facial vision." Tilt-board, after Aubert, for testing sense of position of the body as a whole. Rotation-table, after Aubert, for study of sense of rotation. Great Rotation-apparatus of Mach. Krohn and Bolton Touch-apparatus. Thermæsthesiometer of Scripture. Algometers (2). Balance for gradual changes of pressure after Hall and Motora. Olfactometer after Zwaademaker. Ellis' Harmonical for illustrating Helmholtz's "Sensations of Tone," with standard forks. Set of König forks on resonance boxes. Set of König resonators. König wave-siren disk. Sturtevant blower. Difference-tone whistles. Various small tuning-forks specially tuned. Chromatoskiameter after Holmgren. Hering's horizontal rotation color-mixer (and several others), with large set of disks. Phenophthalmotrope after Donders, and other eye models. Ophthalmometer. Visual-test apparatus in considerable variety. Phacometer after Snellen. Apparatus for Ragona Scina's Experiment, with diagrams. Apparatus for Zöllner's illusion, with moving diagrams. Pseudoscope. Wheatstone Stereoscope (convertible into Telestereoscope) with many diagrams. Horopterscope after Donders. Antirrheoscope after Hall and Bowditch. Apparatus for Rinsing Illusion after Hall and Bowditch. Hering's apparatus for Simultaneous Contrast, two forms. Hering's "Shader." Masks for the conversion of relief. Diagrams of standard optical illusions. Binocular Stroboscope. Hipp Chronoscope, with regulating and other subsidiary apparatus in considerable variety. Large pendulum regulator, devised at Clark. High-speed Chronograph after Wundt. Pendulum Chronograph, devised at Clark. Fall Chronometer after Cattel. Eastman Personal Equation Machine. Pendulum for Complication Experiments after Wundt. Time-sense apparatus after Wundt. Apparatus for study of least observable interval between stimuli addressed to the same and to disparate senses, devised at Clark, two forms. Ludwig Kymograph. Continuous-paper Kymograph. Neuromœbimeter after Bowditch. Bowditch Slow-motion Pendulum. Metronomes and special pendulums in variety. Time-markers and signals in several forms. Electric forks and vibrators from 4 to 500 per sec. Induction coil for sparks. Sliding induction coils (4). Electric motors, several of small

size. *Augenmassapparat*, three pieces. Artificial star apparatus for classification of stars according to magnitudes, two forms. Pressure-balance after Jastrow. Mosso's Balanced-bed. Sphygmomanometer after Mosso. Laryngoscope and Grüber's Speculæ. Various anthropometric apparatus after Galton.

The collection of apparatus is constantly increasing by purchase or construction, especially of apparatus for particular researches. For such apparatus the major part of the annual appropriation of the department is expended.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and especially on their current literature. The collection on Criminology and related topics is also full. The following journals are on file at the University :

Vierteljahrsschrift für wissenschaftliche Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosophy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Philosophische Monatshefte. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophische Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Sperimentale di Freniatria e di Medicina Legale. Sphinx. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Archiv für systematische Philosophie. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Besides these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1896–97 the following courses will be given:

DR. G. STANLEY HALL'S COURSES.

A. HISTORY OF PSYCHOLOGY AND PHILOSOPHY from the prescholastic period to the present. This course will include Scholasticism, the Early Mystics, German Philosophy from Boëhme, English from Bacon, etc., and will dwell upon contemporary tendencies and living men in the latter part of the year. The efficient coöperation of Mr. S. S. Green, librarian of the Public Library, has been very helpful to this course, and all its resources are open to students of the University in a special room in the library building.

Four hours weekly throughout the year.

B. GENETIC PSYCHOLOGY. This course will treat of the evolution of the psychic activities, and seek to present the results of the studies of instinct and of children.

One hour weekly throughout the year.

C. SYSTEMATIC PSYCHOLOGY. Presentation of the leading problems and results of Psychology from the lecturer's point of view.

Time to be later considered.

D. The Saturday morning lecture on "Education" will be devoted to the leading topics of interest in the field.

E. CONFERENCES will be held in the President's library Monday evenings, as during the present year, for reading, discussion, etc. One three-hour session weekly.

F. STUDENTS' LECTURE COURSES. All students in the

*Psychological Department* are expected to give one or more lectures, open to members of the University, upon topics to which they have given chief attention during the year. These courses have been both valuable and attractive.

All students in this and the Educational Department are expected to select early in the year, after conference with instructors, who will suggest and advise, some topic of research upon which special work shall be done during the year, with a view to obtaining results to be submitted for publication by the end of June.

### Dr. Sanford's Courses.

A. Experimental Psychology.—This course will consist of

1. *Psychological Practicum.* Laboratory Practice and Informal Lectures on Methods, Apparatus and Results. The aim is here to familiarize the student with the most important types of experimentation, and to give him a certain facility in handling standard pieces of apparatus. During the second half year the student will be assigned a problem for experimental solution under competent direction. The scope of the problems is roughly indicated by the Minor Studies published in Vols. V and VI of the *American Journal of Psychology.* Four hours a week throughout the year.

2. *Psychological Seminary.* Discussion of topics of current Psychological interest; critical reading of recent literature; and short lecture courses on special topics. One hour a week throughout the year.

3. *Original Research.* Advanced students are directed in their work by Dr. Sanford in coöperation with Dr. Hall and Dr. Burnham. The laboratories are open for advanced work at times to suit the convenience of those engaged in it.

B. General Psychology.—This course is intended primarily for students of Pedagogy and others desiring a general account of the subject. It will consist of

1. A *Course of Lectures* and Demonstrations outlining the field of normal Psychology. One hour a week throughout the year.

2. A *Laboratory Course of Pedagogical Tests and Measurements*. The purpose of this course will be to familiarize the student with those mental and bodily measurements which have been found most significant in studies of school children and college students. This course may be taken as a supplement to Dr. Burnham's Course C. One hour a week throughout the first half-year.

## Anthropology.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be taken up:

A. General, embracing: (a) History, scope and relations of the science of Anthropology. (b) Physical Anthropology. Problems, investigations, results, laboratory work. (c) Ethnography. Races and race-origins. (d) Ethnology, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religious. (e) Linguistics. Race and language. Origin and development of language and of languages. Psychology of language. Gesture-speech and written language. Comparative linguistics. Comparative literature. (f) Criminal and Pathological Anthropology. Ethnic morals. (g) Historical and Archæological. Primitive man and primitive culture.

B. Special courses on the following and other topics:

The Anthropology of Childhood; Civilization and Evolution; Primitive Pedagogy and Education; Degeneration; The Anthropological History of the United States; Problems of Race-Contact and Race-Mixture; The Philosophy of Primitive Mythologies; Primitive Speech; Origin and Development of Social Institutions; Heredity and Environment in Anthropology; Race-Psychology and Individual Psychology; Anthropology of Religion; Anthropometry of School-Children.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University and every effort will be made to bring to bear the latest results of Anthropological investigations.

From time to time, reviews of the most important current

literature will be made and students acquainted with the best contributions to Anthropological science in the various foreign languages.

## Course in Psychiatry.

A. Work of the Past Year. During the past year a course of eight clinics has been given at the Worcester Lunatic Hospital, by Adolph Meyer, M. D., constituting a short outline of such neurological and psychiatric problems as allow of clinical demonstration.

An important point in the study of the patients, was the attempt to show just how far we could attribute the various symptoms to known fundamental and anatomical lesions, where our neurological views began to leave the ground of actual observation and became mere logical inference, and where we entered upon the field of pure psychology. The first two clinics were devoted to cases demonstrating the general plan of organization of the nervous system by affections of the peripheral and central motor and sensory pathways—peripheral paralysis, infantile paralysis, lesions of the pyramidal tracts locomotor ataxia, polyneuritis, hemianæsthesia and hemranapsia in hemoplegia, and psychical sensory-motor disorders. The next two clinics dealt with the various forms and stages of general paralysis, leading over to the pure psychoses. Patients with depression formed the subject of the next clinic; they called for an analysis of the various symptom complexes of neurasthenic hypochondriasis, melancholia, psychoses with fear, delusional insanity with depression, and stupor; an attempt was made to sketch a plan of investigation of the nosological value of the various features. The cases of exaltation and of excitement were treated in a similar way with a view to separate the purely manic symptom-complex from that of delirium, of confusion, and of acute dementia. Two clinics were devoted to the types of degeneration, imbecility, degeneration in the period of puberty, paranoia and circular insanity and the last demonstration covered the field of senile psychoses.

B. Work of Next Year.—During the winter of 1896-1897 a similar course will be given, consisting of 10 clinics of 2 hours,

duration, and lectures introductory to the subject of the demonstrations as far as considered desirable. Besides a fuller consideration of the subjects dealt with in this year's course, the problems of cerebral localization will receive some attention as far as the clinical material will allow, especially the mechanisms of speech and vision. It is also hoped that cases of hysteria can be secured.

The course is intended for psychologists and neurologists.

C. Anthropological Course. Dr. Myer also proposes a free course in the methods of study of the signs of degeneration in the insane. Conducted at the Worcester Lunatic Hospital. The aim will be to familiarize students interested in this work with the methods of registration of the physical signs of degeneration and the principles involved in the use of the results of measurements, etc.

The *American Journal of Psychology* is issued at the University, and serves as a convenient medium for prompt publication of investigations brought to a conclusion in the department of Psychology.

## VI.

## EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of men :

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects :

I. (a) Child-Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) Typical Schools and Special Foundations. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

IV. Higher Education, including university work, technical education; training in law, medicine, and theology; recent progress, present state and prospects of the most advanced education in different countries, including our own.

The courses in Education for 1896–97 will be as follows:

Dr. G. Stanley Hall's Course.

The leading present topics in Education. One hour weekly throughout the year.

Dr. Burnham's Courses.

A. The Organization of Schools in Europe, especially in England, France, and Germany. The genesis of the school systems and their wider social and political relations. Educational ideals. Typical schools. Recent movements. One hour a week throughout the year.

B. The Modern Educational Movement begun by Rousseau and Pestalozzi. The influence of these reformers on educational ideals, methods, the organization of schools, and on politics and society. Their disciples and opponents. Realism and Neo-Humanism. Basedow, Fichte, Richter, Gœthe, Schleiermacher, *el al.* One hour a week, half a year.

C. The Hygiene of Instruction and School Anthropometry. The results of physiological, psychological, and anthropological investigations that relate to the hygiene of instruction in Reading, Singing, Writing, Manual Training, Arithmetic, etc.; the choice and sequence of studies, the period of study, methods of study and discipline. This course is designed for students taking Dr. Sanford's course B, 2. One hour a week, half a year.

The work of the *Seminary*, once a week throughout the year, will be, for the most part, adapted to individual students. It is hoped that each student will select, after conference with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

The courses as announced above may be modified somewhat

as the needs of the students or other circumstances may require.

Dr. Lukens has lectured through the year on the History of Curricula. The aim has been to make an historical study of what in the past has been deemed the culture material best adapted for educational use in the training of the young; and, secondly, to trace as far as is possible in the history of education the treatment of the problems concerning the connection and sequence of studies.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*
4. *General Surveys* and Reports on the Present Condition of Education.
5. *Standard Writers* on Education and *Biographies.*
6. *Educational Psychology.*
7. *General Works on the Theory of Education.*
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene.*
10. *The Study of Children, the Kindergarten*, etc.
11. *The State and Laws*, Civic Education, Administration and School Organization.
12. *Industrial and Technical Education.*
13. *Miscellaneous.*

14. *School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).
15. *Education of Defectives.*
16. *Art Education*, including Museums, etc.
17. *The Training of Teachers*; Examinations, etc.
18. *Moral Education* and School Discipline.
19. *University Education.*
20. *The Learned Professions.*
21. *Special Topics.*
22. *Special Reports of the Bureau of Education.*
23. *Miscellaneous Pamphlets.*
24. *Periodicals.*
25. *Miscellaneous Reports;* a, American; b, English; c. French; d, German; etc.
26. *Text-books;* a, Mathematics; b, Science; c, Drawing; etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous; i, History.
27. *Old Text-books*, with same sub-divisions as above.
28. *State and City Reports*, sub-divided by states.
29. *Charts*, *Maps*, *Pictures*, etc.
30. *Religious Education.*

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society and its valuable historical material are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed, which contains a valuable collection of EDUCATIONAL APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

# LIBRARY.

The University Library contains 16,000 bound volumes and 1,500 pamphlets, and the reading room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

A Works of General Reference.
B Journals.
C Mathematics.
D Physics.
E Chemistry.
F Zoölogy.
G Physiology.
H Pathology.
I Psychology.
J Philosophy.
K Ethics.
L Criminology.
M Anthropology.
N Education.
O Botany.

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found :

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A Medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time ; and by the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

## LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out ; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department ; and these shall be placed by themselves and marked "reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken out on Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

# BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care, and that of the authorities of the University, shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty, the Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations, but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts in behalf of the University without authority, the officer

or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and coöperation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified and held for that purpose.

## REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible orders for only the kind and amount of apparatus certain to be used during the year shall be placed ; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year:

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

## PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of the University on October 2nd, 1889.

III. Register and Second Official Announcement, May, 1890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the first statement of the plan, aims and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University ; pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth Official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

## JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

The American Journal of Psychology. This *Journal* was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford and E. B. Titchener (Cornell University) with the assistance of an international board of coöperators. Each volume contains four numbers of over 150 pages each. Besides original articles, about one-third its space is devoted to careful digests of the important literature in its field. Price, $5 per volume; single numbers, $1.50. J. H. Orpha, publisher, Worcester, Mass.

The Pedagogical Seminary. This journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 1 and 2, $5 each; Vol. 3, $4. Single numbers, $1.50. J. H. Orpha, publisher, Worcester, Mass.

# CLARK UNIVERSITY,

WORCESTER, MASS.

# REGISTER

AND

## Ninth Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
April, 1897.

## CALENDAR: 1897-98.

1897.

JUNE 17. Thursday. Present academic year ends.

SEPT. 30. Thursday. Ninth academic year begins.

DEC. 23. Thursday.
1898.
JAN. 1. Saturday. } Christmas Recess.

APR. 4. Monday.
– 9. Saturday. } Spring Recess.

JUNE 16. Thursday. Ninth academic year closes.

# MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880–81; Professor of Psychology, Johns Hopkins University, 1881–88; LL. D., University of Michigan, 1888, and Williams College, 1889; Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874–75; Tutor of Mathematics, Harvard University, 1875–76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876–89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888–89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889–91; Instructor in Biology, University of Wisconsin, 1891–92.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Assistant Professor of Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology, Johns Hopkins University, 1888.

HENRY TABER, PH. D., 9 Oread Place.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888, and Assistant in Mathematics, Johns Hopkins University, 1888–89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Assistant Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885–86; Parker Fellow, 1886–89; Student, Universities of Berlin, Paris, Stockholm, 1886–90; Ph. D., Berlin, 1890; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Instructor in Pedagogy.

A. B., with honors in Philosophy, Harvard University, 1882; Instructor in Wittenberg College, 1882-83; Instructor in the State Normal School, Potsdam, N. Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89.

ALEXANDER F. CHAMBERLAIN, PH. D., 10 Beaver St.
Lecturer in Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto, 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in German in University College, and the University of Toronto, 1888-92; Examiner in Modern Languages in the University of Trinity College, Toronto, 1890-91; Examiner in French and German, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92, and Lecturer in Anthropology, 1892; Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Fellow of the American Association for the advancement of Science.

JOSEPH DE PEROTT, 15 Florence St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., Philadelphia, Pa.,
Docent in Pedagogy. 70 Florence St.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95; Lecturer in Education, Bryn Mawr College, 1896-97.

ADOLF MEYER, M. D., Worcester Lunatic Hospital.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91; Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95; Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

HENRY ROLFE BAKER, M. A., B. D., Fairfax, Ia.,
Honorary Fellow in Psychology. 70 Florence St.

A. B., Iowa College, 1882, A. M., 1885; B. D., Yale University, 1886; Congregational Ministry, 1887; Graduate Student in Philosophy, Harvard University, 1890-91; Student in Psychology, Clark University, 1894-95; Fellow, 1895-96.

E. W. BOHANNON, A. M., Boonville, Ind.,
Fellow in Psychology. 70 Florence St.

Graduate, Ind. State Normal School, 1887; Supt. of Schools, Brownsburg, Ind., 1887-88, A. B., Indiana University, 1890; Supt. of Schools, Plainfield, Ind., 1889-91; Principal, High School, Pekin, Ill., 1891-92; A. M., Indiana University, 1892; Supt. of Schools, Rensselaer, Ind., 1892-95; Scholar in Pedagogy, Clark University 1895-96.

JAMES W. BOYCE, B. S., West Burke, Vt.,
Fellow in Mathematics. 6 Charlotte St.

B. S., University of Vermont, 1896.

WILLIAM P. BOYNTON, A. M., Los Angeles, Cal.,
Fellow in Physics. 70 Florence St.

A. B., Dartmouth, 1890, A. M., 1893; Professor of Physics and Chemistry, University of Southern California, 1890-93; Graduate Scholar and Assistant in Physics, Dartmouth College, 1893-94; Scholar in Physics, Clark University, 1894-95; Fellow, 1895-96.

FREDERICK WELTON COLEGROVE, D. D., Clinton, N. Y.,
Honorary Fellow in Psychology. 4 Charlotte St.

A. B., Colgate University, 1882; A. M., 1885; Student in Hamilton Theological Seminary, 1882-84; D. D., University of Rochester, 1893; Principal Collegiate Institute, Marion, N. Y., 1884-89; Professor of Latin, Colgate University, 1889-92; President, Ottawa University, Ottawa, Kansas, 1892-96.

H. S. CURTIS, B. A., Olivet, Mich.,
Fellow in Psychology. 5 Gates St.

B. A., Olivet College, 1894; B. A., Yale University, 1895 (with honors in Philosophy); Fellow in Psychology, Clark University, 1895-96.

GEO. E. DAWSON, A. B., Ann Arbor, Mich.,
Fellow in Psychology. 54 Illinois St.

A. B., University of Michigan, 1887; Teacher of Greek and English Literature Carleton Institute (Mo.), 1887-88; Student, University of Leipzig, 1888-89; Principal, Oil City (Pa.) High School, 1888-91; Professor of English and Literature, State Agricultural and Mechanical College, So. Dakota, 1891-93; Instructor in English, University of Michigan, 1893-95; Fellow in Psychology, Clark University, 1895-96.

ALEXANDER CASWELL ELLIS, A. B, Louisburg, N. C.,
Fellow in Psychology. 1018 Main St.

A. B., University of North Carolina, 1894; Student in Summer School of Physical Culture, Harvard University, 1894; Head Master, Classical High School, Chapel Hill, N. C., 1891-92; Scholar in Pedagogy, Clark University, 1894-95; Fellow in Psychology, 1895-96.

FREDERICK C. FERRY, A. M., Saratoga Springs, N. Y.,
Fellow in Mathematics. 11 Freeland St.

A. B., Williams College, 1891; Instructor, Latin and Mathematics, Williams College, 1891-94; A. M., Williams College, 1894; Graduate Student in Mathematics, Harvard University, 1894-95; A. M., Harvard University, 1895; Fellow in Mathematics, Clark University, 1895-96.

JOHN S. FRENCH, A. B., Norway, Me.,
Fellow in Mathematics. 4 Charlotte St.

A. B., Bowdoin College, 1895; Scholar in Mathematics, Clark University, Worcester, Mass., 1895-96.

CEPHAS GUILLET, A. B., Cobourg, Ont., Canada,
Fellow in Psychology. 5 May St.

A. B., Victoria University, Cobourg (with honors in English, French and German Literature), 1887; Modern Language Master, Perth, Ont., 1887-90; Modern Language Master, Ottawa, Ont., 1890-94; Student at Law, Osgood Hall, Toronto, 1894-95; Examiner in English and French, Victoria University, 1888-89; Associate Examiner in French and German, Ontario Dept. of Education, 1891-94; Examiner in French, Toronto University, 1893-95; Scholar in Psychology, Clark University, 1895-96.

J. P. HYLAN, Concord, N. H.,
Fellow in Psychology. 10 Barbour St.

Student, Harvard University, 1891-95; Fellow in Psychology, Clark University, 1895-96.

ELLSWORTH GAGE LANCASTER, M. A., B. D., Eureka, Kan.,
Fellow in Psychology. Catalpa St.

B. A., Amherst College, 1885, and M. A., 1888; Teacher Elocution and Physical Culture, Williston Seminary, Easthampton, Mass., 1885-86; Student, Auburn Theological Seminary, 1886-87; Teacher Physical Culture, Latin and German, Morgan Park Military Academy, also Student Chicago Baptist Seminary, 1887-88; Andover Theological Seminary, 1888-89; B. D., Andover, 1889; Pastor Congregational Church, Ashby, Mass., 1889-90; Principal, Southern Kansas Academy, 1890-95; Scholar in Psychology, Clark University, 1895-96.

ERNEST H. LINDLEY, A. M., Bloomington, Ind.,
Fellow in Psychology. 9 Maywood St.

A. B., Indiana University, 1893, and A. M., 1894; Instructor in Philosophy, Indiana University, 1893-95; Fellow in Psychology, Clark University, 1895-96.

E. W. RETTGER, A. B., Huntingburg, Ind.,
Fellow in Mathematics. 70 Florence St.

Graduate, Indiana State Normal School, 1891; A. B., Indiana University, 1893; Principal, Rensselaer (Ind.) High School, 1893-94; Instructor in Mathematics, Indiana University, 1894-95; Fellow in Mathematics, Clark University, 1895-96.

JOHN C. SHAW, M. S., Kasson, W. Va.,
Fellow in Psychology. 925 Main St.

Graduate, State Normal School, Fairmont, W. Va., 1889; Principal, Graded Schools, Paw Paw, W. Va., 1889-90; B. S., University of Nashville, 1892; Peabody Normal College, Nashville, Tenn., 1893; M. S., University of Nashville, 1894; Teacher of Mathematics, Marshall College, Marshall, Ark., 1894-95; Scholar in Pedagogy, Clark University, 1895-96.

MAURICE H. SMALL, A. B., Westbrook, Me.,
Fellow in Psychology. 4 Charlotte St.

A. B., Colby University, 1887; Principal, Norway High School, Norway, Me., 1887-92; Principal, Westbrook High School, Westbrook, Me., 1892-95; Scholar in Psychology, Clark University, 1895-96.

EDWIN D. STARBUCK, A. M., Bridgeport, Ind.,
Fellow in Psychology. 53 Hollywood St.

A. B., Indiana University, 1890; A. B., Harvard University, 1894, and A. M., 1895; Teacher of Mathematics and Latin, Spiceland (Ind.) Academy, 1890-91; Teacher of Mathematics, Vincennes (Ind.) College, 1891-93; Student in Psychology, Harvard University, 1893-95; Fellow in Psychology, Clark University, 1895-96.

COLIN C. STEWART, B. A., Toronto, Canada,
Fellow in Physiology. 84 Woodland St.

B. A., University of Toronto, 1894; Scholar in Physiology, Clark University, 1894-95; Fellow, 1895-96.

J. RICHARD STREET, A. M., Palmyra, Ont., Canada,
Fellow in Psychology. 49 Hollywood St.

A. B., Victoria University, 1884, and A. M., 1888; Modern Language Master, Smithville High School, 1885-86, and Walkerton High School, 1886-87; Principal Caledonia High School, 1887-95; Scholar in Pedagogy, Clark University, 1895-96.

ALBERT P. WILLS, B. E. E., Waltham, Mass.,
Fellow in Physics. 75 Florence St.

B. E. E., Tufts College, 1894 (with honors in Electricity); Scholar in Physics, Clark University, 1894-95; Fellow, 1895-96; Professor of Physical Sciences, Colorado State Normal School, since Jan. 1897.

FREDERIC LISTER BURK, A. M., Mountain View, Cal.,
Scholar in Psychology. 4 Charlotte St.

B. L., University of California, 1883; Instructor in Literature and History, California Military Academy, 1889-90; Instructor in Mathematics, Berkeley Gymnasium, 1890-91; Graduate Student, Philosophy of Literature, University of California, 1890-91; Graduate Student in Philosophy, Stanford University, 1891-92; A. M., Stanford University, 1892; Supervising Principal of Schools, Santa Rosa, California, 1892-96.

ARTHUR L. CLARK, S. B., Worcester, Mass.,
Scholar in Physics. 15 Wayne St.

S. B., Worcester Polytechnic Institute, 1894; Instructor in Mathematics and Physics, Bridgton Academy (Me.), 1895-96.

HERBERT OTIS CLOUGH, A. B., Kennebunkport, Me.,
Scholar in Mathematics. 887 Main St.

A. B., Bowdoin College, 1896.

T. R. CROSWELL, A. B., Farmington Falls, Me.,
Scholar in Pedagogy. 5 Gates St.

A. B., Bowdoin College, 1891; Principal, Wilton Academy, 1891-94; Student in Pedagogy, Columbia College, 1894-95; Scholar in Pedagogy, Clark University, 1895-96.

H. L. EVERETT, A. M.,
Scholar in Psychology. 29 Bowdoin St.

A. B., Brown University, 1886; A. M., Harvard University, 1889; Student; Berlin University, 1889-90; Professor at Utah Agricultural College, 1890-92.

J. IRWIN FRANCE, A. B., Johnstown, N. Y.,
Scholar in Psychology. 1018 Main St.

A. B., Hamilton College (Root Scientific Fellowship, with honors in Biology), 1895; Marine Biological Laboratory, Wood's Holl, summer of 1894; Laboratory of U. S. Fish Commission, Wood's Holl, summer of 1895; University of Leipzig, 1895-96.

HENRY H. GODDARD, A. M., Vassalboro, Me.,
Scholar in Psychology. 4 Charlotte St.

A. B., Haverford College, 1887, A. M., 1889; Instructor in Latin and History, University of So. California, 1887-88; Graduate Student, Haverford College, 1888-89; Principal, Damascus Academy, 1889-91; Instructor in Latin and Greek, Oak Grove Seminary, Vassalboro, Me., 1891-93; Principal, 1893-96.

LINUS WARD KLINE, B. S., Calverton, Va.,
Scholar in Psychology. 5 Gates St.

L. I., Peabody Normal College, Nashville, Tenn., 1889; Principal, Hamilton Grammar School, Houston, Tex., 1891-93; B. S., Harvard University, 1896.

J. F. MORSE, B. D., St. Johnsbury, Vt.,
Scholar in Psychology. 56 Hollywood St.

A. B., Amherst College, 1884; Instructor in Greek and Philosophy, Park College, Parkville, Mo., 1884-86; B. D., Yale Divinity School, 1889; Principal, Denmark Academy (Ia.), 1890-94; Graduate Student, Wisconsin University, 1894-96.

GEORGE E. PARTRIDGE, Worcester, Mass.,
Scholar in Psychology. 54 Hollywood St.

Special Student in Philosophy, Clark University, 1895-96.

T. RICHARD PEEDE, 50 Woodland St.
Honorary Scholar in Philosophy.

Pastor South Baptist Church, Worcester, Mass.; Christian Biblical Institute, N. Y. 1881-1884; Boston University, 1884-5; Special Student in Philosophy and Pedagogy, Clark University, 1895-96.

DANIEL EDWARD PHILLIPS, A. M., Athens, Ga.,
Honorary Scholar in Psychology. 925 Main St.

Graduate, West Virginia State Normal School, 1890; Principal, Public Schools, Philippi, W. Va., 1890-91; A. B., University of Nashville, 1892, A. M., 1894; Institute Instructor in W. Va., summers of 1892-94; Scholar in Psychology, Clark University, 1894-95; Teacher of Pedagogy, Normal Department, University of Ga., March, 1895-Jan., 1897.

ALVA ROY SCOTT, Worcester, Mass.,
Honorary Scholar in Psychology. 887 Main St.

A. B., De Pauw University, 1886; A. M., 1889; Principal, Leavenworth Schools, 1886-87; McCormick Theological Seminary, Chicago, 1888-91; Pastor, First Presbyterian Church, Hanover, Ill., 1891-93; Studied Charitable Institutions in Europe, 1892; Graduate Student, Harvard University, 1893-94; Pastor, First Presbyterian Church, Worcester, since October, 1894; Honorary Scholar in Psychology, Clark University, 1894-95; Ph. D., University of Wooster, 1896.

A. HARRY WHEELER, S. B., Worcester, Mass.,
Scholar in Mathematics. 69 Merrick St.

S. B., Worcester Polytechnic Institute, 1894; Instructor in Mathematics English High School, Worcester, Mass., 1894 to Dec., 1896.

H. G. BENNEYAN,
Student in Psychology. 25 Lincoln St.

Pastor of the Armenian Congregational Church, Worcester, Mass.

ALLEN R. DEFENDORF, M. D., New Haven, Conn.,
Worcester Lunatic Hospital.

B. A., Yale University, 1894; M. D. (with honors), Medical Department, Yale University, 1896; Interne at Worcester Lunatic Hospital, 1896-97.

R. R. GURLEY, M. D., M. S., Washington, D. C.,
Worcester Lunatic Hospital.

M. D. (with honors), Med. Dept. Columbian Univ., Washington, D. C.; Scientific Assistant, Dept. Invertebrate Palæontology, U. S. National Museum, 1886-90; Scientific Assistant U. S. Fish Commission, 1890-95; Assistant Palæontologist, U. S. Geological Survey, 1895; M. S., Graduate School, Columbian University, Washington, D. C., 1895; Fellow in Biology, Clark University, 1895-96; Interne at Worcester Lunatic Hospital, 1896-97.

LOUIS N. WILSON,
Librarian and Clerk of the University. 11 Shirley St.

# ADMINISTRATION.

The trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively, through the three committees named below, and also through the President of the University.

## BOARD OF TRUSTEES.

JONAS G. CLARK,

| | |
|---|---|
| STEPHEN SALISBURY, | JOHN D. WASHBURN, |
| GEORGE F. HOAR, | FRANK P. GOULDING, |
| WILLIAM W. RICE,* | GEORGE SWAN, |
| EDWARD COWLES, | THOMAS H. GAGE. |

## OFFICERS.

| | |
|---|---|
| President, - - - | JONAS G. CLARK, |
| Vice-Presidents, - - | GEORGE F. HOAR,<br>WILLIAM W. RICE,* |
| Treasurer, - - - | THOMAS H. GAGE. |
| Secretary, - - - | FRANK P. GOULDING. |

## COMMITTEES.

*Finance.*

JONAS G. CLARK, STEPHEN SALISBURY,
JOHN D. WASHBURN, THOMAS H. GAGE.

*Buildings.*

JONAS G. CLARK, JOHN D. WASHBURN.

*By-Laws.*

JONAS G. CLARK,
WILLIAM W. RICE,* STEPHEN SALISBURY,
JOHN D. WASHBURN, GEORGE SWAN.

*Died March 1st, 1896.

### President.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent, or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the corporation, September 26, 1889.

## FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

### I. University Senate.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangment, cataloguing and use of books and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

# GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:


| | | |
|---|---|---|
| I. | MATHEMATICS. | (Page 26) |
| II. | PHYSICS. | ( " 35) |
| III. | CHEMISTRY. | ( " 43) |
| IV. | BIOLOGY. | ( " 44) |
| V. | PSYCHOLOGY. | ( " 52) |


In addition to these *Education* is now a sub-department. (Page 59.)

## ADMISSION.

Only graduate students are admitted, or those of equivalent attainments, except in rare and special cases. At present no entrance examinations are required, but by testimonials, diplomas, personal interviews or written specimens of work, the authorities must be satisfied that the applicant has scholarship enough to work to advantage, and zeal and ability enough to devote himself to his chosen field. The methods of the University

are too costly, and its energy and funds too precious, to be spent upon men who are not well trained, promising and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges, and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief as well as the best work of this University is individual, and involves daily suggestion, encouragement and direction.

## Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits his power in teaching. This, and the custom of instructors of attending each other's lectures, add interest and efficiency to the work of the University.

## I. Docents.

The highest annual appointment is that of Docent. These positions are primarily honors, and are reserved for a few men whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their deparment, their time will be mainly reserved for study and research in a way best adapted to qualify them still more fully for academic advancement.

These positions are now official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can now be furnished on application and which requires a memoir or essay representing original work in their own department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability, and so far as this diploma can have the significance of a

title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that by the existence of such a select body of men of guaranteed scientific training, ability and approved power to teach, the difficulties under which college trustees sometimes succumb in selecting suitable men for their professors may be diminished, and that otherwise this new grade will aid in raising standards of academic scholarship in colleges and in encouraging scientific research here. Good men of this class may be paid a salary.

## II. Candidates for the Degree of Doctor of Philosophy.

In most cases it is probable that three, or at least two, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time when, in the judgment of the University authorities, the candidate is prepared. A pre-arranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a thesis upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be reported on in writing by the chief instructor, printed at the

expense of the candidate, and at least one hundred copies given to the University. In case, however, of theses of very unusual length, or containing very expensive plates, the academic Senate shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty. Each of these copies shall bear upon it in print the statement of the chief instructor that it is a thesis for the Doctor's degree in his department at Clark University.

Such formal or informal tests as the academic Senate shall determine, shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede by not less than six months and not more than one year the examination itself, and the nature and result of this test shall be made matter of record.

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the thesis must be in the hands of the Librarian before the diploma is given. In exceptional cases, however, and by special action of the Senate, the ceremony of promotion may precede the presentation of the printed copies of the

thesis. The latter, however, must always precede the actual presentation of the diploma.

An oral but not a written examination is required upon at least one minor subject in addition to the major, before an examination jury, composed of at least four members, including the head of the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examination to the Senate, who, if they are also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard requirements for it be kept the highest practicable, that it be reserved for men of superior ability and attainment only, and that its value here be never suffered to depreciate.

It is to the needs of these students that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are pri-

marily intended, although any of these honors may be awarded to others.

### III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the University, may also be received. This class includes those who may desire to devote themselves exclusively to one or more of the special branches—mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to matriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners, in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

## IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes, who are nearly, if not quite qualified to become candidates for the degree of Doctor of Philosophy, may also be received.

Students of this class must for the present have completed the work of the first three years of a regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their attainments, and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

## Fellowships and Scholarships.

The sum of $4,800 is now devoted to Fellowships. This may provide for eight Senior Fellowships at $400 each, and eight Junior Fellowships at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 is also remitted, thus making the value of these Fellowships $600 and $400 each respectfully.

Besides these, sixteen other appointments,

viz.: eight Senior University Scholarships which remit all the fee and Eight Junior University Scholarships remitting one-half the fee, have been provided. These sixteen Scholarships have thus a value of $200 each to Senior and $100 each to Junior Scholars.

The total value of all these appointments is thus $10,400.

The founder of the University and his wife unite with the Trustees and President in inviting sympathy and practical coöperation in the multiplication of such aids, large or small, temporary or permanent, here at the outset.

### A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

### The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

## Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three learned professions, although the latter are not excluded.

Applications should state the candidate's course of study and be accompanied by testimonials or diplomas; should indicate a decided preference for some special department, and, if possible, be accompanied by some specimen of his work for the aid of the Board of Selection. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during the year. The names of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the en-

tire academic year and devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must coöperate in promoting harmony, order and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Because intended primarily as honors, both Fellowships and Scholarships are awarded without reference to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

## METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each in-

structor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus and reference to standard text-books, and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will from time to time be given.

Seminaries. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded, and the efficiency of universities has been greatly increased.

Laboratory Work. For beginners this has been from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators are tested, methods discussed and perfected, with a view to developing that independence in research which is the consummation of scientific culture.

## NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $200 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will, so far as possible, be informed upon any of these or other points, in advance of official announcement, upon addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendence to its close.

The following are the statements and announcements of the departments for the current year, 1897-98.

# I.

## MATHEMATICS.

### Programme for 1897–98.

### INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is

given by means of introductory, advanced, and special courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

*Group* A:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Theory of Functions of Real and Imaginary Variables and Definite Integrals; 3 hours a week, through the year.

Theory of Numbers; 2 hours a week, one-half year.

Modern Synthetic Geometry; 2 hours a week, one half-year.

*Group* B:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Elliptic Functions Differential Equations, and Calculus of Variations; 3 hours a week, through the year.

Algebraic Substitutions and their Applications to the Theory of Equations; 2 hours a week, one half-year.

Analytic Geometry of Higher Surfaces and Twisted Curves; 2 hours a week, one half-year.

Algebraic Invariants; 2 hours a week, one half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the

present day. Thus, for example, the conic sections and quadric surfaces are treated by modern methods from the beginning, with adequate consideration of the discoveries of the great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

*Special advanced courses*, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the degree of Doctor of Philosophy.

---

For the academic year 1897–98, the following courses are offered :

BY PROFESSOR STORY.

Advanced courses:

SIMULTANEOUS ALGEBRAIC EQUATIONS; 2 hours a week, first half-year.

ENUMERATIVE GEOMETRY; 3 hours a week, second half-year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory courses:

ANALYTIC GEOMETRY OF HIGHER SURFACES AND TWISTED CURVES; 3 hours a week, first half-year.

ALGEBRAIC INVARIANTS; 2 hours a week, second half-year.

BY ASSISTANT PROFESSOR TABER.

Advanced course:

CONTINUOUS GROUPS; 2 hours a week, through the year.

Introductory courses:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES AND HIGHER PLANE CURVES; and

DIFFERENTIAL EQUATIONS, ELLIPTIC FUNCTIONS, AND CALCULUS OF VARIATIONS; together 6 hours a week, through the year.

SEMINARY in connection with these introductory courses; through the year.

BY M. DE PEROTT.

Advanced course:

THEORY OF NUMBERS; 2 hours a week, first half-year.

Introductory course:

ALGEBRAIC SUBSTITUTIONS AND THEIR APPLICATIONS TO THE THEORY OF EQUATIONS; 2 hours a week, second half-year.

During the academic years 1889–97, advanced and special courses have been given in:

1. THE HISTORY OF ARITHMETIC AND ALGEBRA among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.

3. Linear Transformations and Algebraic Invariants, with applications to algebraic equations and geometry.

4. Theory of Substitutions, with applications to algebraic equations.

5. Plane Analytic Geometry.

6. Solid Analytic Geometry.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass's Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general the-

ory of linear differential equations, Gauss's, Legendre's, and Bessel's functions.

30. Partial Differential Equations, including Laplace's Bessel's, and Lamé's functions.

31. Finite Differences and Probabilities.

32. Applications of the Infinitesimal Calculus to the Theory of Surfaces.

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors ; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several

instructors, and those who have attained the necessary proficiency are personally directed in individual researches, of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented memoirs embodying the results of original investigations that receive the approval of the head of the department, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University. Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

## MATERIAL FACILITIES.

The library is provided with the more important text-books, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any considerable extent to mathematics. Among the periodicals of which the library has complete or nearly complete sets are the following:

Abhandlungen der Math.-Phys. Classe der Königl. Sächs-

ischen Gesellschaft der Wissenschaften. Vols. 1-14. Leipzig, 1852–88.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences. Paris, 1835–96.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892–95.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 1853–88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798–1896.

Transactions of the Philosophical Society of Cambridge. 1822–94.

Philosophical Transactions of the Royal Society. London, 1665–1897. Complete.

Proceedings of the Cambridge Philosophical Society. Vols. 1–9. 1843–97.

Proceedings of the Royal Society of London. 1800–97.

Acta Mathematica. Stockholm, Berlin and Paris. 1882–97.

American Journal of Mathematics. Baltimore, 1878–97.

Annales scientifiques de l'Ecole Normale Supérieure. Paris, 1864–97.

Bulletin des Sciences Mathématiques (Darboux, etc.). Paris, 1870–97.

Bulletin de la Société Mathématique de France. Paris, 1873–97.

Jahrbuch über die Fortschritte der Mathematik. Berlin, 1868–97.

Journal de l'Ecole Polytechnique, etc. Paris, 1794–1897.

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Paris, 1836–97, with registers to series I, vols. 1–15.

Journal für reine und angewandte Mathematik (Crelle, etc.). Berlin, 1826–97.

Mathematische Annalen (Clebsch, etc.). Leipzig, 1869–97.

The Oxford, Cambridge and Dublin Messenger of Mathematics. London, Cambridge, 1862–97.

Nouvelles Annales de Mathématiques. Paris, 1842–91.

Proceedings of the London Mathematical Society. London, 1865–97.

Quarterly Journal of Mathematics, pure and applied. London, 1857–97.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Vols. 34–42. Leipzig, 1888–97.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread-models of developable surfaces.

The department possesses also :

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

# II.

## PHYSICS.

This department is under the direction of Assistant Professor Arthur G. Webster, Ph. D., who will regularly deliver, with a period of two years, the following cycle of courses :

1. Dynamics.—General Methods, Canonical Equations, Systems of Particles, Rigid Bodies.

2. Newtonian and Logarithmic Potential Functions. Attraction of Ellipsoids.

3. Elasticity, Hydrodynamics, Wave Motion, Dynamical Basis of Sound and Light.

3 a. Dynamics of Cyclic and Oscillatory Systems, with Applications to Theory of Electricity, Sound and Light.

4. Electricity and Magnetism.

5. Optics, Physical and Geometrical. — Elastic and Electromagnetic Wave-theories.

6. Thermodynamics, Thermo- and Electro-Chemistry, Kinetic Theory of Gases.

7. The Partial Differential Equations of Mathematical Physics.

Laplace's Equation, Equation of Thermal and Electrical Conduction, Equation of Wave motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's, Bessel's, and Lamé's Functions.

The courses for the year 1897–8 will be 5, 6, and 7.

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there will be held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals. Besides the above regular courses, advanced courses will, from time to time, be given on such subjects as the Figure of the Earth, Theory of Tides, Theory of Sound, and Possible Theories of the Ether.

The aim of the department is to ensure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put to work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will at all times have the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of

lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches, and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance, may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat, the steady flow of electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, so far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical

preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the Calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivatives, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation, may be recommended to the student Greenhill's, Williamson's, or Byerly's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus's Determinants.

### Requirements for the Doctor's Degree.

1. The ability to read at sight specimens of scientific French and German, tested six months before the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics,* and upon the subjects named above in Theoretical Physics, as a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the Physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfillment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the

* Every student is recommended to provide himself with Winkelmann's *Handbuch der Physik* as a work for continual reference.

work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment to science to encourage research in new fields by immature and ill-prepared minds and hands.

## Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall, the storage battery and dynamo switch board, Dr. Webster's drop chronograph, and the standard condenser and other apparatus used in determining "$v$."

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it are at present placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires, with the motor and blower used in driving it, and the governor to the high-speed chronograph, which latter stands on a pier in room B. In room B are two piers standing in front of the windows, and designed for spectroscopic work. The room C contains the astronomical clock and balances, and is also used for electrical work. The room E is fitted up as a general workshop, and contains a lathe, planer, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery.

The further end is used as a carpenter shop for pattern-making, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at present used for optical work. The next room is the professor's office, and also contains cases for the apparatus when not in use, together with a store-room at one end. On the walls is a large collection of blue-prints of mathematical diagrams, the originals of the figures in Dr. Webster's "Electricity and Magnetism." Here are also a number of interesting models used in the teaching of dynamics, thermo-dynamics, electricity, etc., the number of which is continually increasing, and some of which are rarely to be found. The third room is the lecture-room, and is adorned with Rowland's great spectrum map. All the rooms are wired with several sets of wires from the switch-board, so that direct current of various voltages, and alternating current, may be had at any time.

Special mention should be made of the work-shop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied from a ten-horse-power Armington & Sims engine with independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided.

## The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M., and any number of books may be taken out by any person, and

kept ten days. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though small, is carefully selected, and while the number of volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may be fairly said to contain the best works. Among others may perhaps be mentioned:

*Collected Writings* of Helmholtz, Kirchhoff, Thomson, Green, Joule, Stokes, Gauss, Fourier, Laplace, Cauchy.

*Potential, Electricity and Magnetism.* Riemann, Betti, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Boltzmann, Mascart and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

*Elasticity.* Mathieu, Ibbetson, Love, Todhunter and Pearson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

*Hydrodynamics.* Bassett, Lamb, Kirchhoff, Neumann, Poincaré.

*Light.* Mascart, Kirchhoff, Neumann, Volkmann, Résal, Poincaré, Bassett, Preston.

*Heat.* Clausius, Rühlman, Boltzmann, Bertrand, Zeuner, Poincaré, Preston.

*Sound.* Rayleigh, Donkin.

A large number of treatises on Mechanics, and a set of the Mémoires et Travaux du Comité International de Poids et Mesures, may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.
Proceedings Royal Society.

Philosophical Magazine.
Physical Review.
Nature.

The library subscribes to the following journals:

American Journal of Science.
Philosophical Magazine.
Philosophical Transactions.
Proceedings Royal Society.
Physical Review.
Electrician.
Electrical World.
Nature.
Science.
Journal of Physical Chemistry.
Annalen der Physik u. Chemie.
Beiblätter " "
Zeitschrift für Instrumentenkunde.
Journal de Physique.
Comptes Rendus.

## III.

## CHEMISTRY.

No courses will be offered in this department during the year 1897–98.

## IV.

## BIOLOGY.

### Programme of Work for Year 1897–98.

Dr. Hodge will offer the following courses:

I. Comparative Study of Nervous Systems and Sense Organs. The point of view of this course will be both anatomical and physiological. It is intended to begin with a study, as far as possible comparative, of the structural elements of the nervous system in both invertebrates and vertebrates. Following this, it is proposed to consider the structure and functions of the nervous system in a series of animals, beginning with the cœlenterata and ascending through the mollusca, vermes, tunicata, arthropoda and vertebrates. The course will be illustrated, so far as possible, by diagrams, models, dissections and experiments. One lecture weekly, October to January.

II. General Biology. This course is intended to give in general outline the fundamental principles of biological science. The most general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organisms. The topics: *Methods and aims of biological research*, *origin of living matter organization*, *growth* and *reproduction*, *heredity*, *differentiation* and *evolution* will be given special prominence throughout the course. One lecture weekly. Laboratory work will be arranged to suit the requirements of those taking the course.

In future each of the above courses will be given in extenso during alternate years, course I being given in 1897–98. Course I will be abbreviated to about six lectures during January and February.

The biological seminary will meet one evening weekly throughout the year.

## PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations and laboratory work in the following lines :

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divisions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1897 and 98 will be offered as follows :

III. Muscle and Nerve Physiology. This course will include reflex action. It will extend from October to January, with lectures, demonstrations, and laboratory work arranged to meet the requirements of students taking the course.

By way of supplementing the above courses and courses in other departments of the University, two courses have been planned as follows :

V. Embryology and Growth of the Human Brain and Sense Organs. Six lectures, with demonstrations and literature.

VI. Practical Histology of the Nervous System. The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

## Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research, the resources of the department are such that he will be given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and State universities, is sufficient to enable students to begin work here.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own microscopical glass, slides and covers, and must pay the cost price of all glass ware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahrsberichte and Centralblätter greatly facilitates the work of referring to the literature of topics under investigation in the laboratory.

The Journal Club meets weekly, for the purpose of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.

Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.

Jahresberichte über die Fortschritte der Anatomie und Physiologie, 1873–1898, complete.

Jahresberichte über die Fortschritte der Reinen, Pharmaceutischen und Technischen Chemie, etc., 1847–1887, complete.

Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.

Royal Society Catalogue of Scientific Papers, complete.

To the above may be added the four following taken by the Green Library, and accessible to students, viz.:

Centralblatt für die Medicinischen Wissenschaften, complete.

Morphologisches Jahrbuch, complete.

Monatsschrift, International, für Anatomie und Histologie.

Schmit's Jahrbücher der in- und ausländischen gesammten Medicin.

---

Abhandlungen der math.-phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.

Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesellschaft der Wissenschaften. Leipzig, 1852–88.

American Journal of Science.

American Naturalist, 1888–97.

Alienist and Neurologist, 1890–97.

Annales de l'Institut Pasteur. Vols. 3–5.

Arbeiten a. d. physiologischen Institut Tübingen.

Archiv für Anatomie und Physiologie, 1796, complete to 1897.

Archiv für Anatomie und Entwickelungsschichte, His and Braune, complete.

Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete.

Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).

Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889–97.

Archiv für Mikroscopische Anatomie. (Complete set in Green Library.)

Archives de Biologie, 1889–97.

Archives Italiennes de Biologie, 1889–97. (Complete set in Green Library.)

Archives de Neurologie, 1890–97.

Archives de Physiologie Normale et Pathologique, 1889–97.

Archives de Zoologie Expérimentale et Générale.

Beiträge zur Anatomie und Physiologie von Eckhard, 1858–88.

Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886–97.

Berichte über die Leistungen in der Naturgeschichte der Niederen Thiere, 1848–53, 57–60, 61–65, 66–69, 70–71, 72–75, 76–79.

Bibliotheca Zoologica; Taschenberg Lieferungen. 1886–97.

Claus Arbeiten aus dem zoologischen Institut der Universität Wein und der zoologischen Station in Trieste, 1878–97.

Deutsche Zeitschrift für Nervenheilkunde, 1891–97.

Internationale Monatsschrift für Anatomie und Physiologie, 1889–97.

Johns Hopkins Hospital Bulletins, 1890–97.

Journal de l'Anatomie et de la Physiologie, 1889–97.

Journal of the Coll. of Science, Imperial University of Japan, to date.

Journal of the Marine Biological Association of the United Kingdom. Vols. I–III.

Journal of Comparative Neurology, 1891–97.

Journal of Morphology, complete.

Journal of Nervous and Mental Disease, 1890–97.

Journal of Physiology, complete.

Journal of the Royal Microscopical Society, 1878–96.

Laboratoire d'Histologie du Collège de France, Années 1874, 83-88.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k. p., Ak. d. Wissen zu Berlin, 1882–93.

Mind, 1876–97.

Mittheilungen aus der Zoologischen Station zu Neaple, complete, 1879–97.

Nature, 1869–97.

Froriep, Notizen, 1822–36, in 50 parts; 1837–46, in 40 parts.

Pflüger's Archiv. für die Gesammte Physiologie, complete, 1868–97.

Philosophical Society of Cambridge, Transactions, 1822–97, complete.
Philosophical Transactions of the Royal Society, London, 1665–1897, complete with indexes.
Popular Science Monthly, 1872–97.
Proceedings of the Cambridge Philosophical Society, 1843–97.
Proceedings of the Royal Society of London, 1800–97.
Quarterly Journal of Microscopical Science, 1889–93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenger, complete.
Revue Scientifique, 1889–97.
Revue des Sciences Médicales en France et à l'Etranger, Hayem, 1889–97.
Revue de Médicine. Vols. IX–XVII.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884–97.
Verhandlungen der physiologischen Gesellschaft zu Berlin, 1886–97.
Zeitschrift für Biologie, 1889–97.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche Medicin, 1888–97.
Zeitschrift für Psychologie und Physiologie der Sinnesorgane, complete.
Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.
Zoölogical Record, 1864–97.
Zeitschrift für wissenschaftliche Mikroskopie, 1889–97.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

## V.

## PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory and Attention. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias, neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic below.

IV. Anthropological psychology; Myths, Custom and Belief, Comparative Religion and Psychology of Religion, Primitive Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

V. Æsthetics and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VI. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses.

VII. Applications of psychology; pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sexual problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

The PSYCHOLOGICAL LABORATORY consists of a suite of five rooms on the second floor of the main building, one large and four small. The large room is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, the third as a battery room, and the fourth as a store room for apparatus. A large room on the third floor is also used for auditory experiments and others requiring freedom from ordinary noise.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measurements. Many pieces have been manufactured at the University and a considerable number designed here for special researches. The collection is constantly increasing by purchase or construction, especially in apparatus for research.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and

especially in their current literature. The collection on Criminology and related topics is also full. The following Journals are on file at the University:

Vierteljahrsschrift für wissenschaftliche Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosophy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Philosophische Monatschefte. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophishe Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Sperimentale di Freniatria e di Medicina Legale. Sphinx. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Archiv für systematische Philosophie. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Besides these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1897–98 the following courses will be given:

## Dr. G. Stanley Hall's Courses.

Dr. G. Stanley Hall will offer the following courses:—

I. Contemporary Philosophy.

(a.) The Scotch School, beginning with Hartley and including Paley, Hutchinson, Adam Smith, Reid, Stewart, Brown, Sir William Hamilton, Stuart Mill, Bain, Ferrier, etc.

(b.) The French School, from Cousin and Comte to Renouvier, Taine and Feuillée.

(c.) Contemporary English Philosophy including James Mill, Whewell, Jevons, Darwin, Spencer, Maurice, de Morgan, Caird, Ward, etc.

(d.) German Philosophy and Psychology; Herbart, Schleiermacher, Trendelenburg, Schopenhauer, Lotze, Fechner, Sigwart, Wundt, Lange, Helmholtz, Haeckel, Weismann, Hertwig.

(e.) A brief sketch of American philosophical thought from Edwards to the present day.

These and other modern writers will be treated for the most part individually by the method of concise exposition and resumé, and with some discussion of the most recent literature on the lines they represent, and with an account of other new movements, opinions and tendencies.

From two to four hours a week.

II. General Cosmology.

This course will present the general views, conclusions and fundamental ideas of the chief sciences that deal with nature, with an attempt to co-ordinate the scientific and poetic views of nature and to show the genetic, psychological, and pedagogical connections between the standpoint of children and savages on the one hand, and the non-anthropomorphic and mechanical standpoint of the mature scientific mind on the other. This will involve a discussion of the higher anthropology and especially of fundamental religious ideas.

One or two hours a week.

III. Select Topics in Education.

One hour, weekly, Saturday mornings.

IV. Psychological Seminary.

Weekly, from seven to ten, Monday evenings.

Students' Lecture Courses. All students in the *Psychological Department* are expected to give one or more lectures, open to members of the University, upon topics to which they have given chief attention during the year. These courses have been both valuable and attractive.

All students in this and the Educational Department are expected to select early in the year, after conference with instructors, who will suggest and advise, some topic of research upon which special work shall be done during the year, with a view to obtaining results to be submitted for publication by the end of June.

Dr. Sanford's Courses.

A. Experimental Psychology. This course will consist of

1. *Psychological Practicum.* Laboratory Practice and Informal Lectures on Methods, Apparatus and Results. The aim is here to familiarize the student with the most important kinds of experimentation, and to give him a certain facility in handling standard pieces of apparatus. During the second half year the student will be assigned a problem for experimental solution under competent direction. The scope of the problems is roughly indicated by the Minor Studies published in Vols. V and VI of the *American Journal of Psychology.* Four hours a week throughout the year.

2. *Psychological Seminary.* Discussion of topics of current psychological interest; critical reading of recent literature; and short lecture courses on special topics. One hour a week throughout the year.

3. *Original Research.* Advanced students are directed in their work by Dr. Sanford in coöperation with Dr. Hall and Dr.

Burnham. The laboratories are open for advanced work at times suited to the convenience of those engaged in it.

B. General Psychology.—This course is intended primarily for students of Pedagogy and others desiring a general account of the subject, and may be advantageously taken in connection with Dr. Burnham's course B on *Pedagogical Applications of Psychology*. It will consist of

1. *A Course of Lectures and Demonstrations* outlining the field of normal Psychology. One hour a week throughout the year.

2. *A Laboratory Course of Pedagogical Tests and Measurements*. The purpose of this course will be to familiarize the student with those mental and bodily measurements that have been found most significant in studies of school children and college students. One hour a week till Christmas.

## Anthropology.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be taken up:

A. General, embracing: (a) History, scope and relations of the science of Anthropology. (b) Physical Anthropology. Problems, investigations, results, laboratory work. (c) Ethnography. Races and race-origins. (d) Ethnology, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religions. (e) Linguistics. Race and language. Origin and development of language and of languages. Psychology of language. Gesture-speech and written language. Comparative linguistics. Comparative literature. (f) Criminal and Pathological Anthropology. Ethnic morals. (g) Historical and Archæological. Primitive man and primitive culture.

B. Special courses embody the results of the most recent and important studies and investigations in the following among other fields: Anthropometry of Children and Youth; Primitive Children and Children of Civilized Races; Anthropology of Childhood; Myths and Myth-makers; the Psychology of the Languages of Primitive Peoples; Sociology and the History of Human Institutions—the Family, the State, the Church; the

Origin and Development of Civilization; Anthropological Problems and Results.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University and every effort will be made to bring to bear the latest results of Anthropological investigations.

From time to time, reviews of the most important current literature will be made and students acquainted with the best contributions to Anthropological science in the various foreign languages.

## Course in Psychiatry.

Dr. Adolf Meyer's course during the year covered the foling ground:

1. Introductory remarks on the general biological conceptions from which the data of the course would be presented. The general biological principles applied to the study of abnormal life. Relation between neurology and psychology, neuropathology and psychiatry, neurological and psychical phenomena from the biological standpoint. Application of the point of view to alcoholic intoxication and to several forms of mental disease. Demonstration: Cases of Febrile Delirium, General Paralysis, Catatonia and Idiocy.

2. Review of the general pathology on the ground of the aspect-hypothesis. The terms disease, residual, defective formation, and defective anlage. Clinical and post-mortem pathology and their share in general pathology. Only clinical pathology furnishes data on the psychological and physiological side. Plan of clinical study. Anatomical study. Our knowledge of the macroscopic and microscopic lesions of the nervous system and the underlying pathological processes, defective nutrition, intoxications, abnormal function. Local disorders: Abnormal circulation, local intoxications, traumatic disorders, over-activity, perverted function. Demonstrations of abnormal brains and histological changes.

3. The general plan of the nervous system and illustrations of diseases of various parts (levels). The neural tube; the segmentary arrangement and the elements of the segments

within the lowest level. The middle level apparatus—cerebellum, midbrain and forebrain and their afferent and efferent connections. Demonstrations: 1. Traumatic paralysis of nervous peroneus. 2. Infantile paralysis. 3. Cases of hemiplegia. 4. Lead paralysis (Remak type). 5. Alcohol neuritis. 6. Locomotor ataxia.

4. The principles of localization. The meaning of the connections of neurones by numerous collaterals, of the "interruptions of the tracts by gray matter," of the term "center." Description of the most important "centers," the lesions of the apparatus of mimic movements, the sensorimotor areas, the principal "sensory" projection fields. An outline of the principles of aphasia and its forms, of hemianopsia. Highest level symptoms. Demonstration: Hemiplegia with hemianopsia; two cases of hemiplegia with motor aphasia; one case of sensory aphasia. Reference to a case of Brown-Sequard paralysis.

5. General outline of mental diseases. Classification given last year; explanation of Kraepelin's classification. Illustration of a paradigm of mental disease; General Paralysis, its etiology, symptomatology and principal types. Demonstration of six cases.

6. Toxic psychoses and psychoses on ground of disturbed metabolism. Summary of the data of psycho-physiological study of fatigue and intoxication furnished by the school of Kraepelin. Review of the methods and the results. Application to the clinical problems. Demonstration: Delirium Tremens, Subacute Alcoholic Insanity. Cretinism. Dementia Precox and Catatonia.

7. Periodical Insanity compared with the types of Verbloedungs-processe. Demonstration of further types of Catatonia and of Periodical Insanity; "Acute Mania," "Acute Melancholia."

8. Short sketch of Senile Dementia and demonstration of a case. Constitutional psychoses. Résumé of the methods and aims of individual psychology (Cattell, Münsterberg, Jastrow, Kraepelin, Gilbert, Binet et Henri, Guicciardi and Ferrari). Value of "types" of character or constitution. Their formation. Dominant ideas. Mysophobia as a type of Neurosis of Fear. Development of Paranoia; cases of Paranoia.

## VI.

## EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of men :

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects :

I. (a) Child-Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) Typical Schools and Special Foundations. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

IV. Higher Education, including university work, technical education; training in law, medicine, and theology; recent progress, present state and prospects of the most advanced education in different countries, including our own.

The courses in Education for 1897–98 will be as follows:

Dr. G. Stanley Hall's Course.

Select topics in Education. One hour weekly (Saturday mornings) throughout the year.

Dr. Burnham's Courses.

A. Principles of Education. This course involves a study of important chapters in the history of education, and a brief account of a few representative educational systems. Such topics as the following will be included: Educational ideals. The correlation of educational forces. The family and education. The church and education. State aid and control. The field of scientific study in education. Present problems and tendencies. Once a week, half a year.

B. Pedagogical Applications of Psychology. Some of the most important chapters in psychology in their educational aspects, such as habit, attention, memory. The correlation of physical and psychic processes. Education of the senses. Apperception and association. Diseases of memory. Experimental investigations and methods of study in relation to memory. Feeling and interest in relation to instruction and training. Suggestion as a factor in education. Education in productive activity. Mental hygiene. Mental diseases and faults of school children. Neuroses of development. The hygiene of instruction. Once a week throughout the year. This course may advantageously be taken in connection with Dr. Sanford's course B., on *General Psychology*.

C. School Administration and the Training of Teachers. The school-master in history. The priest as teacher. The evolution of teaching as a profession. The training of teachers in different countries and by different systems. The

essentials of pedagogical training, especially for teachers in the secondary schools. The relation of the teacher to the community, etc. One hour a week, half a year.

D. CONFERENCE, once a week. The work will be determined in part by the needs of the individual students. It is hoped that each student will select, after conference with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

The courses as announced above may be modified somewhat as the needs of the students or other circumstances may require.

DR. LUKENS delivered, during the year 1896–97, two short courses of lectures on

1. *The Life and Work of F. W. Dörpfeld (1824–1893).* Dörpfeld's youthful training under Zahn and his connection with Diesterweg. His early determination to be a "contented, Christian, common-school teacher," and to devote his life to the elevation of the vocation of teaching. *Evangelisches Schulblatt, Die Freie Schulgemeinde.* His share in the Ministerial School Conference of 1872. *Die Theorie des Lehrplans.* His Bible Classes, Teachers' Conferences, Psychological Lectures, Reading Circles, etc., and the work growing out of them. Dörpfeld's personal characteristics. "Father Dörpfeld." "A Teacher of Teachers." His inspiration and its source. His literary style. His biography by his daughter.

*His Ethics.* The Psychology of Belief. Origin of Doubt in Childhood. Its pedagogical treatment. Connection between Faith and Doubt. Religious education.

*His Psychology.* Memory and its place in education. Its relation to Thought. The formation and clarification of concepts as the regular work of instruction. The normal steps in Learning, based on the three divisions of the reflex arc: (1) sensation, (2) long circuiting through the cortex, and (3) action.

*The Curriculum.* Must be normal, i. e., qualitatively complete. Correlation of Content Studies, Language, and Form Studies. The Reading Book. Reform of Language Teaching. It must be based on Nature Study as the chief source of its material.

*School Organization.* The Family as the basis of the Independent School Community (freie Schulgemeinde). Family rights in the school. The home as the source of community life and corrective of pedagogical theory. The four interested parties to school management: (1) the Family, (2) the State, (3) the Church, (4) the political community. Of these only the family has a complete, all-sided interest in the school. The other three participants have only partial interests in the school and therefore are not to be trusted with the independent control of the schools.

2. *On Drawing.* The characteristics of early drawings of children. Pedagogical interpretations. The course in drawing. The development of the drawing power on (1) the receptive or appreciative side, and on (2) the productive side. Mutual interaction of these two sides. The curves of development. Pedagogical applications.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*
4. *General Surveys* and Reports on the Present Condition of Education.
5. *Standard Writers* on Education and *Biographies.*
6. *Educational Psychology.*
7. *General Works on the Theory of Education.*
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene.*

10. *The Study of Children, the Kindergarten*, etc.
11. *The State and Laws*, Civic Education, Administration and School Organization.
12. *Industrial and Technical Education.*
13. *Miscellaneous.*
14. *School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).
15. *Education of Defectives.*
16. *Art Education*, including Museums, etc.
17. *The Training of Teachers;* Examinations, etc.
18. *Moral Education* and School Discipline.
19. *University Education.*
20. *The Learned Professions.*
21. *Special Topics.*
22. *Special Reports of the Bureau of Education.*
23. *Miscellaneous Pamphlets.*
24. *Periodicals.*
25. *Miscellaneous Reports;* a, American; b, English; c, French; d, German; etc.
26. *Text-books;* a, Mathematics; b, Science; c, Drawing, etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous; i, History.
27. *Old Text-books*, with same sub-divisions as above.
28. *State and City Reports*, sub-divided by States.
29. *Charts, Maps, Pictures*, etc.
30. *Religious Education.*

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society, and its valuable historical material, are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed,

which contains a valuable collection of EDUCATIONAL APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

### SPECIAL STUDENTS IN EDUCATION.

In addition to the members of the University the following special students have been admitted during the year, to the Saturday courses of Drs. Hall and Burnham in Education, for a fee of $25.

ARTHUR C. BRYDEN,
Vice-Principal, State Normal School, Bridgewater, Mass.

DANIEL H. CASEY,
Grafton Street School, Worcester, Mass.

C. F. CARROLL,
Superintendent of Schools, Worcester, Mass.

CHARLES WESLEY DELANO,
Classical High School, Worcester, Mass.

MARY A. DRAKE,
Washington Street School, Worcester, Mass.

GERTRUDE EDMUND,
Principal, Training School, Lowell, Mass.

RACHEL C. FISH,
The Dalzell School, Worcester, Mass.

EDWARD R. GOODWIN,
Principal, Classical High School, Worcester, Mass.

EDWARD B. HALE,
Principal, High School, Brookfield, Mass.

CHARLES L. HANSON,
English High School, Worcester, Mass.

BESSIE E. HOWES,
Assistant to Superintendent of Schools, Worcester, Mass.

MRS. ERNEST H. LINDLEY,
9 Maywood Street, Worcester, Mass.

GRACE ELDRIDGE MIX,
Salisbury Street Kindergarten, Worcester, Mass.

ANNIE COOLIDGE RUST,
Kindergarten Normal School, Worcester, Mass.

CLARISSA W. SMITH,
10 Ashland Street, Worcester, Mass.

ELLA LOUISE SMITH,
Classical High School, Worcester, Mass.

MARY TRUMBULL,
English High School, Worcester, Mass.

EMILY H. VIETS,
Salisbury Street Kindergarten, Worcester, Mass.

# LIBRARY.

The University Library contains 16,000 bound volumes and 1,500 pamphlets, and the reading room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

| | | | |
|---|---|---|---|
| A | Works of General Reference. | I | Psychology. |
| B | Journals. | J | Philosophy. |
| C | Mathematics. | K | Ethics. |
| D | Physics. | L | Criminology. |
| E | Chemistry. | M | Anthropology. |
| F | Zoölogy. | N | Education. |
| G | Physiology. | O | Botany. |
| H | Pathology. | | |

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found:

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A Medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time; and by the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

## LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department; and these shall be placed by themselves and marked "reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken out on Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

# BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care and that of the authorities of the University, shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty, the Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations, but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts in behalf of the University without authority, the officer

or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and coöperation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified and held for that purpose.

## REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible orders for only the kind and amount of apparatus certain to be used during the year shall be placed ; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year:

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

## PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of the University on October 2nd, 1889.

III. Register and Second Official Announcement, May, 1890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the first statement of the plan, aims and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University; pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth Official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

XIV. Summer School Programme (July 13 to 25, 1896).

XV. Register and Eighth Official Announcement, April, 1896.

XVI. Summer School Programme (July 19 to 31, 1897).

## JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

The American Journal of Psychology. This Journal was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford and E. B. Titchener (Cornell University) with the assistance of an international board of coöperators. Each volume contains four numbers of about 150 pages each. Besides original articles, a considerable portion of its space is devoted to careful digests of the important literature in its field. Price, $5 per volume; single numbers $1.50. J. H. Orpha, publisher, Worcester, Mass.

The Pedagogical Seminary. This journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 1, 2 and 3, $16.00; Vols. 4 and 5, $5 each. Single numbers, $1.50. J. H. Orpha, publisher, Worcester, Mass.

The Mathematical Review. This journal, of which the first volume is in course of publication, is edited by William E. Story. Its scope includes original research in mathematics, résumés of subjects of a more elementary character, pedagogical and historical sketches and bibliographical notices. Every volume will consist of six numbers of 96 pages each. Each number contains the portrait of some distinguished mathematician. Price $5 a volume. Published by the editor, Worcester, Mass.

# CLARK UNIVERSITY,

WORCESTER, MASS.

---

# REGISTER

AND

## Tenth Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
April, 1898.

## CALENDAR: 1898–99.

1898.

JUNE 16. Thursday P. M. Present academic year ends.

SEPT. 29. Thursday A. M. Tenth academic year begins.

DEC. 22. Thursday A. M.
DEC. 31. Saturday P. M. } Christmas Recess.

1899.

APR. 3. Monday A. M.
– 8. Saturday P. M. } Spring Recess.

JUNE 15. Thursday P. M. Tenth academic year closes.

# MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880-81; Professor of Psychology, Johns Hopkins University, 1881-88; LL. D., University of Michigan, 1888, and Williams College, 1889; Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874-75; Tutor of Mathematics, Harvard University, 1875-76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888-89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889-91; Instructor in Biology, University of Wisconsin, 1891-92.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Assistant Professor of Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology, Johns Hopkins University, 1888.

HENRY TABER, PH. D., 4 Linden St.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888, and Assistant in Mathematics, Johns Hopkins University, 1888-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Assistant Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885-86; Parker Fellow, 1886-89; Student, Universities of Berlin, Paris, Stockholm, 1886-90; Ph. D., Berlin, 1890; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Instructor in Pedagogy.

A. B., Harvard University, 1882; Instructor in Wittenberg College, 1882-83; Instructor in the State Normal School, Potsdam, N. Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89.

ALEXANDER F. CHAMBERLAIN, PH. D., 12 Shirley St.
Lecturer in Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto, 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in German in University College, and the University of Toronto, 1888-92; Examiner in Modern Languages in the University of Trinity College, Toronto, 1890-91; Examiner in French and German, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92, and Lecturer in Anthropology, 1892; Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Fellow of the American Association for the Advancement of Science.

JOSEPH DE PEROTT, 14 Hancock St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., Philadelphia, Pa.
Docent in Pedagogy.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95; Lecturer in Education, Bryn Mawr College, 1896-97.

ADOLF MEYER, M. D., Worcester Lunatic Hospital.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91; Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95; Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

HENRY ROLFE BAKER, M. A., B. D., Fairfax, Ia.,
Honorary Fellow in Psychology. 70 Florence St.

A. B., Iowa College, 1882, A. M., 1885; B. D., Yale University, 1886; Congregational Ministry, 1887; Graduate Student in Philosophy, Harvard University, 1890-91; Student in Psychology, Clark University, 1894-95; Fellow, 1895-97.

E. W. BOHANNON, A. M., Boonville, Ind., 70 Florence St.
Fellow in Psychology.

Graduate, Ind. State Normal School, 1887; Supt. of Schools, Brownsburg, Ind., 1887-88; A. B., Indiana University, 1890; Supt. of Schools, Plainfield, Ind., 1889-91; Principal, High School, Pekin, Ill., 1891-92; A. M., Indiana University, 1892; Supt. of Schools, Rensselaer, Ind., 1892-95; Scholar, Clark University, 1895-96; Fellow, 1896-97.

FREDERICK E. BOLTON, M. S., Tomah, Wis., 9 Gates St.
Honorary Fellow in Psychology.

Graduate, State Normal School, Milwaukee, 1890; Principal of High School, Fairchild, Wis., 1890-91; B. S., University of Wisconsin, 1893; Principal of public schools, Kaukauna, Wis., 1893-95; M. S., University of Wisconsin, 1896; University of Leipzig, Germany, 1896-97.

JAMES W. BOYCE, B. S., Barre, Vt., 10 Barbour St.
Fellow in Mathematics.

B. S., University of Vermont, 1896; Fellow, Clark University, 1896-97.

FREDERIC LISTER BURK, A. M., Mountain View, Cal.,
Honorary Fellow in Psychology. 84 Woodland St.

B. L., University of California, 1883; Instructor in Literature and History, California Military Academy, 1889-90; Instructor in Mathematics, Berkeley Gymnasium, 1890-91; Graduate Student, Philosophy of Literature, University of California, 1890-91; Graduate Student in Philosophy, Stanford University, 1891-92; A. M., Stanford University, 1892; Supervising Principal of Schools, Santa Rosa, California, 1892-96; Fellow, Clark University, 1896-97.

ARTHUR L. CLARK, S. B., Worcester, Mass., 15 Wayne St.
Fellow in Physics.

S. B., Worcester Polytechnic Institute, 1894; Instructor in Mathematics and Physics, Bridgton Academy (Me.), 1895-96; Fellow, Clark University, 1896-97.

CHARLES M. CLINTON, PH. D., 6 Beaver St.
Fellow in Psychology.

Ph. D., Ottawa University; Principal of Public Schools in Wisconsin and Minnesota; County Supt., Wisconsin; Visitor to the State Normal Schools, Wisconsin; Professor, Shattuck School, Faribault, Minn.; Head Master, Peekskill Military College and Fitting School.

FREDERICK WELTON COLEGROVE, D. D., Clinton, N. Y.,
Honorary Fellow in Psychology. 4 Charlotte St.

A. B., Colgate University, 1882; A. M., 1885; Student, Hamilton Theological Seminary, 1882-84; D. D., University of Rochester, 1893; Principal Collegiate Institute, Marion, N. Y., 1884-89; Professor of Latin, Colgate University, 1889-92; President, Ottawa University, Ottawa, Kansas, 1892-96; Honorary Fellow, Clark University, 1897.

H. S. CURTIS, A. B., Olivet, Mich.
Fellow in Psychology.

A. B., Olivet College, 1894; A. B., Yale University, 1896 (with honors in Philosophy); Fellow, Clark University, 1895-97.

H. L. EVERETT, A. M., Worcester, Mass., 24 Newbury St.
Honorary Fellow in Psychology.

A. B., Brown University, 1886; A. M., Harvard University, 1889; Student, Berlin University, 1889-90; Professor, Utah Agricultural College, 1890-92; Scholar, Clark University, 1897.

FREDERICK C. FERRY, A. M., Saratoga Springs, N. Y.,
Fellow in Mathematics. 11 Freeland St.

A. B., Williams College, 1891; Instructor, Latin and Mathematics, Williams College, 1891-94; A. M., Williams College, 1894; Graduate Student in Mathematics, Harvard University, 1894-95; A. M., Harvard University, 1895; Fellow, Clark University, 1895-97.

JOHN S. FRENCH, A. B., Norway, Me., 4 Charlotte St.
Fellow in Mathematics.

A. B., Bowdoin College, 1895; Scholar, Clark University, 1895-96; Fellow, 1896-97.

HENRY H. GODDARD, A. M., Vassalboro, Me., 4 Charlotte St.
Fellow in Psychology.

A. B., Haverford College, 1887, A. M., 1889; Instructor in Latin and History, University of Southern California, 1887-88; Graduate Student, Haverford College, 1888-89; Principal, Damascus Academy, Ohio, 1889-91; Instructor in Latin and Greek, Oak Grove Seminary, Vassalboro, Me., 1891-93; Principal, 1893-96; Scholar, Clark University, 1896-97.

CEPHAS GUILLET, A. B., Cobourg, Ont., Canada, 5 Gates St.
Fellow in Psychology.

A. B., Victoria University, Cobourg (with honors in English, French and German Literature), 1887; Modern Language Master, Perth, Ont., 1887-90; Modern Language Master, Ottawa, Ont., 1890-94; Student at Law, Osgood Hall, Toronto, 1894-95; Scholar, Clark University, 1895-96; Fellow, 1896-97.

LINUS WARD KLINE, B. S., Calverton, Va., 70 Florence St.
Fellow in Psychology.

L. I., Peabody Normal College, Nashville, Tenn., 1889; Principal, Hamilton Grammar School, Houston, Texas, 1891-93; B. S., Harvard University, 1896; Scholar, Clark University, 1896-97.

DANIEL EDWARD PHILLIPS, A. M., Athens, Ga.,
Fellow in Psychology. 53 Hollywood St.

Graduate, West Virginia State Normal School, 1890; Principal, Public Schools, Philippi, W. Va., 1890-91; A. B., University of Nashville, 1892, A. M., 1894; Scholar, Clark University, 1894-95; Teacher of Pedagogy, Normal Department, University of Georgia, March, 1895, Jan., 1897; Scholar, Clark University, 1897.

J. O. QUANTZ, PH. D., Toronto, Canada, 9 Gates St.
Honorary Fellow in Psychology.

B. A. (with first class honors in Philosophy and Psychology), University of Toronto, 1894; Fellow in Psychology, University of Wisconsin, 1895-97; Ph. D., 1897.

E. W. RETTGER, A. B., Huntingburg, Ind., 70 Florence St.
Fellow in Mathematics.

Graduate, Indiana State Normal School, 1891; A. B., Indiana University, 1893; Principal, Reusselaer (Ind.) High School, 1893-94; Instructor in Mathematics, Indiana University, 1894-95; Fellow, Clark University, 1895-97.

ALBERT SCHINZ, PH. D., Neuchatel, Switzerland,
Honorary Fellow in Psychology. 84 Woodland St.

B. A., Neuchatel, 1888, and M. A., 1889; Lic. Theol., Neuchatel, 1892; Student, Univ. of Berlin, 1892-93; Ph. D., Tübingen, 1893; Tübingen, 1894; Paris, Collège de France and Sorbonne, 1894; Second Librarian, Library of Neuchatel, and Associate Professor of Philosophy, University of Neuchatel, 1896-97.

CHARLES H. SEARS, PH. D., West Brewster, Mass.,
Honorary Fellow in Pedagogy. 5 Lowell St.

Graduate, Four Years' Course, State Normal School, Westfield, Mass., 1883; A. M., Alleghany College, 1893, and Ph. D., 1895; Principal of Public Schools, Cheshire, Mass., 1883-85; Teacher, Prospect Park Institute, Brooklyn, N. Y., 1885-88; Teacher of Latin, State Normal School, Edinboro, Pa., 1888-92; Principal, Normal Department, Claflin University, 1892-97.

BENJAMIN F. SHARPE, A. M., 1018 Main St.
Fellow in Physics.

A. B., Wesleyan University, Middletown, Conn., 1887, and A. M., 1890; Adjunct Professor of Physics and Biology, Randolph-Macon College, Ashland, Va., 1887-91; Graduate Student and Scholar Johns Hopkins University, 1891-94; Fellow, Clark University, 1894-96; Professor of Mathematics, State Normal School, New Paltz, N. Y., 1896-97.

HENRY DAVIDSON SHELDON, A. M., Santa Clara, Cal.,
Fellow, and Assistant in Pedagogy. 87 Woodland St.

A. B., Stanford University, 1896; A. M., 1897; Instructor in Department of Education, Stanford University, 1896-97.

MAURICE H. SMALL, A. B., Westbrook, Me., 4 Charlotte St.
Fellow in Psychology.

A. B., Colby University, 1887; Principal, Norway High School, Norway, Me., 1887-92; Principal, Westbrook High School, Westbrook, Me., 1892-95; Scholar, Clark University, 1895-96; Fellow, 1896-97.

J. RICHARD STREET, A. M., Palmyra, Ont., Canada,
Fellow in Psychology. 49 Hollywood St.

A. B., Victoria University, 1884, and A. M., 1888; Modern Language Master, Smithville High School, 1885-86, and Walkerton High School, 1886-87; Principal High School, Caledonia, 1887-95; Scholar, Clark University, 1895-96; Fellow, 1896-97.

ROBERT R. TATNALL, PH. D., Media, Pa., 15 Florence St.
Honorary Fellow in Physics.

S. B., Haverford College, 1890; A. M., 1891; Graduate Student, Johns Hopkins University, 1891-93, and 1894-95; Fellow and Assistant in Physics, Northwestern University, 1893-94; Ph. D., Johns Hopkins University, 1895; Instructor in Physics, University of Pennsylvania, 1895-97.

WILL GRANT CHAMBERS, A. M., Indiana, Pa., Scholar in Psychology. 87 Woodland St.

Graduate, Pennsylvania State Normal School, Lock Haven, Pa., 1887; Instructor in Mathematics, Lock Haven State Normal School, 1887-90; A. B., Lafayette College, 1894 (with honors in English and Philosophy); Instructor in Mathematics, State Normal School, Indiana, Pa., 1894-97; B. S., Indiana State Normal School, 1895; M. S., 1897; A. M., Lafayette College, 1897.

ROBERT CLARK, A. B., Kingston, R. I., 887 Main St. Scholar in Pedagogy.

A. B., Amherst College, 1892; Private Tutor, New York City, 1892-97; Teacher in Private School, 1894-95; Scholar, New York University School of Pedagogy, Oct., 1897—Jan., 1898.

LINDSAY DUNCAN, B. S., Northfield, Mass., 889 Main St. Scholar in Mathematics.

B. S., University of Maine, 1897.

STAFFORD C. EDWARDS, A. M., Nanticoke, N. Y., Scholar in Pedagogy. 68 Florence St.

Classical Graduate, Oneonta (N. Y.) Normal, 1891; A. B., Brown University, 1895; A. M., Philosophy and Pedagogy, Brown University, 1896; Student Teacher of History and English in Providence High School, 1895-96; Principal of Greenport (N. Y.) Union School, 1896-97.

FREDERICK H. HODGE, A. B., Fells, Mass., Scholar in Mathematics. 87 Woodland St.

A. B., Boston University, 1894; Special Student, Bridgewater Normal School, 1894-95; Professor of Mathematics, J. B. Stetson University, 1895-96; Graduate Student in Mathematics, University of Chicago, 1896-97.

EDMUND B. HUEY, A. B., Rimersburg, Pa., 67 Florence St. Scholar in Psychology.

A. B., Lafayette College (first honors in Philosophy and Anglo-Saxon), 1895; Instructor in Latin, Harry Hillman Academy, Wilkes-Barre, Pa., 1896-97.

JAMES EDMUND IVES, Philadelphia, Pa., 1018 Main St. Scholar in Physics.

Assistant Curator, Academy of Natural Sciences, Pa., 1887-93; Instructor in Physics, Drexel Institute, Pa., 1893-97; Jessup Student, Academy of Natural Sciences, Pa., 1887-91; Student in Histology, and Embryology, University of Pennsylvania, 1888-89; Student in Mathematics, 1893-95; Student in Physics, Harvard University, summer of 1894; Student in Physics, Cavendish Laboratory, Cambridge, England, 1896.

TILMON JENKINS, M. A., Mosca, Colo., 18 Clifton St. Scholar in Pedagogy.

B. A., National Normal University, 1882; M. A., 1891; Professor of Didactics, Salina (Kan.) Normal University, 1883-85; Supt. of Schools, Kingman (Kan.), 1885-87; Educational work in Colo., 1887-96; Asst. State Supt. of Pub. Inst. of Colo., 1894; Supt. of Schools, Santa Fé, New Mex., 1896-97.

MILTON S. KISTLER, A. M., Blaine, Pa., 4 Hammond St.
Scholar in Pedagogy.

Graduate, West Chester (Pa.) State Normal School, 1888; Principal, High School, Honey Brook, Pa., 1888-89; Principal, Blaine Normal Institute, Blaine, Pa., 1889-90; Ph. B., Dickinson College, 1894; A. M., 1897; Professor of Latin and English, Edinboro (Pa.) State Normal School, 1894-97.

HALCOTT C. MORENO, A. M., Gainesville, Ga.,
Scholar in Mathematics. 68 Florence St.

A. B., University of Georgia, 1893; A. M., 1894; B. L., 1896; Tutor in Mathematics, 1893-97.

GEORGE E. PARTRIDGE, Worcester, Mass.,
Scholar in Psychology. 54 Hollywood St.

Special Student in Philosophy, Clark University, 1895-96; Scholar, 1896-97.

STEPHEN ELMER SLOCUM, B. E., Schenectady, N. Y.,
Scholar in Mathematics. 10 Barbour St.

B. E., Union University, 1897 (with honors in Mathematics and Physics).

WILLARD STANTON SMALL, A. M., 68 Florence St.
Scholar in Psychology.

A. B., Tufts College, 1894; Tufts Divinity School, 1894-96; Professor of English Language and Literature, Lombard University, 1896-97; A. M., Tufts College, 1897.

JOHN N. VAN DER VRIES, A. B., Grand Rapid, Mich.,
Scholar in Mathematics. 68 Florence St.

A. B., Hope College, 1896; Principal of School, East Saugatuck, Mich., 1896-97.

A. HARRY WHEELER, S. B., Worcester, Mass.,
Scholar in Mathematics. 8 Shawmut St.

S. B., Worcester Polytechnic Institute, 1894; Instructor in Mathematics English High School, Worcester, Mass., 1894 to Dec., 1896; Scholar in Mathematics, Clark University, 1897.

GUY MONTROSE WHIPPLE, A. B., Danvers, Mass.,
Scholar and Assistant in Psychology. 75 Florence St.

A. B., Brown University, 1897.

FRANK B. WILLIAMS, M. S., Warrensburg, Mo.,
Scholar in Mathematics. 70 Florence St.

C. E., Missouri State University, 1890; Teaching Fellow in Mathematics, Missouri State University, 1892-93; M. S., Missouri State University, 1893; U. S. Asst. Engineer, Tennessee River Improvement, 1895-97.

MINOSUKE YAMAGUCHI, A. B., Kurume, Japan,
Scholar in Psychology. 87 Woodland St.

LL. B., Tokio Law School, 1892; Student in Philosophy, De Pauw University, Ind., 1894-97; A. B., Lombard University, 1897.

LEWIS EDWIN YORK, Ph. D., Randolph, Ohio, 5 Lowell St.
Scholar in Pedagogy.

Tutor in Mathematics, Mt. Union College, 1891-93; B. S., Mt. Union College, 1894; Supt. Public Schools, Newton Falls, Ohio, 1894-96; Graduate King's School of Oratory, 1896; Ph. D. (*Pro Merito*), Duquesne College, 1897; President of Duquesne College, 1896-97.

---

## Special Students Attending the Saturday Morning Teachers' Course.

MISS NELLIE B. ALLEN,
State Normal School, Fitchburg, Mass.

* H. G. BENNEYAN,
Pastor of the Armenian Cong'l Church, Worcester, Mass.

MRS. C. W. CLINTON,
Worcester, Mass.

* STEPHEN S. COLVIN, Ph. D.,
English High School, Worcester, Mass.

* MISS ABBY C. HALE,
Worcester, Mass.

MISS ELLEN M. HASKELL,
State Normal School, Worcester, Mass.

MISS GRACE L. HAYES,
Training School, Beverly, Mass.

C. L. JUDKINS,
Principal High School, Oxford, Mass.

J. F. KEMPFER,
Worcester, Mass.

* CHARLES H. KEYES,
Principal High School, Holyoke, Mass.

C. S. LYMAN,
Supt. of Schools, Oxford, Mass.

---

* Taking work in other courses.

*WILL S. MONROE,
State Normal School, Westfield, Mass.

ELMAR H. WILMARTH,
Manual Training High School, Worcester, Mass.

---

LOUIS N. WILSON,
Librarian and Clerk of the University. 11 Shirley St.

*Taking work in other courses.

# ADMINISTRATION.

The trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively, through the three committees named below, and also through the President of the University.

## BOARD OF TRUSTEES.

JONAS G. CLARK,

STEPHEN SALISBURY, JOHN D. WASHBURN,
GEORGE F. HOAR, FRANK P. GOULDING,
WILLIAM W. RICE,* GEORGE SWAN,
EDWARD COWLES, THOMAS H. GAGE.

## OFFICERS.

| | |
|---|---|
| President, | JONAS G. CLARK, |
| Vice-Presidents, | GEORGE F. HOAR, WILLIAM W. RICE,* |
| Treasurer, | THOMAS H. GAGE, |
| Secretary, | FRANK P. GOULDING. |

## COMMITTEES.

*Finance.*

JONAS G. CLARK, STEPHEN SALISBURY,
JOHN D. WASHBURN, THOMAS H. GAGE.

*Buildings.*

JONAS G. CLARK, JOHN D. WASHBURN.

*By-Laws.*

JONAS G. CLARK,

WILLIAM W. RICE,* STEPHEN SALISBURY,
JOHN D. WASHBURN, GEORGE SWAN.

*Died March 1st, 1896.

## President.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent, or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the corporation, Sept. 26, 1889.

## FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

### I. University Senate.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangement, cataloguing and use of books and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

# GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:

I. Mathematics.
II. Physics.
III. Chemistry.
IV. Biology.
V. Psychology.

In addition to these *Education* is now a subdepartment of Psychology.

## Admission.

Graduate students only are admitted, or those of equivalent attainments, except in rare and special cases. At present no entrance examinations are required, but by testimonials, diplomas, personal interviews, or written specimens of work, the authorities must be satisfied that the applicant has scholarship enough to work to advantage, and zeal and ability enough to devote himself to his chosen field. The methods of the University are too costly, and its energy and funds too pre-

cious, to be spent upon men who are not well trained, promising and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges, and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief as well as the best work of this University is individual, and involves daily suggestion, encouragement and direction.

## Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits his power in teaching. This, and the custom of instructors in attending each other's lectures, add interest and efficiency to the work of the University.

## I. Docents.

The highest annual appointment is that of Docent. These positions are primarily honors, and are reserved for a few men whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their department, their time will be mainly reserved for study and reseach in a way best adapted to qualify them still more fully for academic advancement.

These positions are now official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can now be furnished on application and which requires a memoir or essay representing original work in their own department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability, and so far as this diploma can have the significance of a

title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that by the existence of such a select body of men of guaranteed scientific training, ability and approved power to teach, the difficulties under which college trustees sometimes succumb in selecting suitable men for their professors may be diminished, and that otherwise this new grade will aid in raising standards of academic scholarships in colleges and in encouraging scientific research here. Good men of this class may be paid a salary.

## II. Candidates for the Degree of Doctor of Philosophy.

In most cases it is probable that three, or at least two, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time when, in the judgment of the University authorities, the candidate is prepared. A prearranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a thesis upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be reported on in writing by the chief instructor, printed at the

expense of the candidate, and at least one hundred copies given to the University. In case, however, of theses of very unusual length, or containing very expensive plates, the academic Senate shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty. Each of these copies shall bear upon it in print the statement of the chief instructor that it is a thesis for the Doctor's degree in his department at Clark University.

Such formal or informal tests as the academic Senate shall determine, shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede by not less than six months and not more than one year the examination itself, and the nature and result of this test shall be made matter of record.

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the thesis must be in the hands of the Librarian before the diploma is given. In exceptional cases, however, and by special action of the Senate, the ceremony of promotion may precede the presentation of the printed copies of the

thesis. The latter, however, must always precede the actual presentation of the diploma.

An oral but not a written examination is required upon at least one minor subject in addition to the major, before an examination jury composed of at least four members, including the head of the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examinations, to the Senate, who, if they are also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard requirements for it be kept the highest practicable, that it be reserved for men of superior ability and attainment only, and that its value here be never suffered to depreciate.

It is to the needs of these students that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are pri-

marily intended, although any of these honors may be awarded to others.

## III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the University, may also be received. This class includes those who may desire to devote themselves exclusively to one or more of the special branches—mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to matriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

## IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes, who are nearly, if not quite qualified to become candidates for the degree of Doctor of Philosophy, may also be received.

Students of this class must for the present have completed the work of the first three years of a regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their attainments, and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

## Fellowships and Scholarships.

Until last year the sum of $4,800 was devoted to Fellowships. The plan then was to thus provide for eight Senior Fellows at $400 each, and eight Junior Fellows at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 was remitted, thus the value of these Fellowships was $600 and $400 each, respectively.

Besides these, sixteen other appointments were

made, viz.: eight Senior University Scholarships, remitting all the fee, and eight Junior University Scholarships, remitting one-half the fee.

While the University desires to continue this plan, it was able last year only to approximate it as far as the reduced funds available for this purpose permitted. For next year the same conditions seem likely to prevail. The significance of Junior and Senior Fellowships and Scholarships will, therefore, remain unchanged, but the income of the appointees must probably be somewhat diminished.

### A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

### The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

## Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three learned professions, although the latter are not excluded.

Applications should state the candidate's course of study, and be accompanied by testimonials or diplomas; should indicate a decided preference for some special department, and, if possible, be accompanied by some specimen of his work for the aid of the Board of Selection. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during the year. The names of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the en-

tire academic year and devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must co-operate in promoting harmony, order and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Because intended primarily as honors, both Fellowships and Scholarships are awarded without reference to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

## METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each in-

structor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus and reference to standard text-books, and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will from time to time be given.

SEMINARIES. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded, and the efficiency of universities has been greatly increased.

LABORATORY WORK. For beginners this has been from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators are tested, methods discussed and perfected, with a view to developing that independence in research which is the consummation of scientific culture.

## NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $200 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will be given information, so far as possible, upon any of these or other points, in advance of official announcement, upon addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendence to its close.

The following are the statements and announcements of the departments for the academic year, 1898-99.

# I.

## MATHEMATICS.

### Programme for 1898–99.

### INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is given by means of introductory, advanced, and special

courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

*Group* A:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Theory of Functions of Real and Imaginary Variables and Definite Integrals; 3 hours a week, through the year.

Theory of Numbers; 2 hours a week, one half-year.

Modern Synthetic Geometry; 2 hours a week, one half-year.

*Group* B:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Elliptic Functions, Differential Equations, and Calculus of Variations; 3 hours a week, through the year.

Algebraic Substitutions and their Applications to the Theory of Equations; 2 hours a week, one half-year.

Analytic Geometry of Higher Surfaces and Twisted Curves; 2 hours a week, one half-year.

Algebraic Invariants; 2 hours a week, one half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the present day. Thus, for example, the conic sections and

quadric surfaces are treated by modern methods from the beginning, with adequate consideration of the discoveries of the great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

*Special advanced courses*, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the degree of Doctor of Philosophy.

---

For the academic year 1898-99, the following courses are offered:

BY PROFESSOR STORY.

Advanced courses:

FINITE DIFFERENCES; 2 hours a week, first half-year.

HYPERSPACE AND NONEUCLIDEAN GEOMETRY; 3 hours a week, through the year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory course:

MODERN SYNTHETIC GEOMETRY; 2 hours a week, second half-year.

BY ASSISTANT PROFESSOR TABER.

Advanced course:

THEORY OF TRANSFORMATION GROUPS; 36 lectures.

Introductory courses:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

THEORY OF FUNCTIONS OF REAL AND IMAGINARY VARIABLES AND DEFINITE INTEGRALS; 3 hours a week, through the year.

SEMINARY; through the year.

BY M. DE PEROTT.

Advanced course:

RIEMANN'S SURFACES AND ADELIAN INTEGRALS; 2 hours a week, second half-year.

Introductory course:

THEORY OF NUMBERS; 2 hours a week, first half-year.

---

During the academic years 1889-98, advanced and special courses have been given in:

1. THE HISTORY OF ARITHMETIC AND ALGEBRA among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.
3. LINEAR TRANSFORMATIONS AND ALGEBRAIC INVARIANTS, with applications to algebraic equations and geometry.
4. THEORY OF SUBSTITUTIONS, with applications to algebraic equations.
5. PLANE ANALYTIC GEOMETRY.
6. SOLID ANALYTIC GEOMETRY.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass's Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general theory of linear differential equations, Gauss's, Legendre's, and Bessel's functions.

30. Partial Differential Equations, including Laplace's Bessel's, and Lamé's functions.

31. Finite Differences and Probabilities.

32. Applications of the Infinitesimal Calculus to the Theory of Surfaces.

33. Simultaneous Equations, including Restricted Systems.

34. Theory of Transformation Groups.

35. The Application of Transformation Groups to Differential Equations.

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible, to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several instructors, and those who have attained the necessary proficiency are personally directed in individual researches,

of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented memoirs embodying the results of original investigations that receive the approval of the head of the department, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University.[1] Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

## MATERIAL FACILITIES.

The library is provided with the more important textbooks, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any considerable extent to mathematics. Among the periodicals of which the library has complete or nearly complete sets are the following:

Abhandlungen der Math.-Phys. Classe der Königl. Sächs-

[1] For requirements see p. 41.

ischen Gesellschaft der Wissenschaften. Vols. 1-14. Leipzig, 1852–88.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences. Paris, 1835–96.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892–95.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 1853–88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798–1898.

Transactions of the Philosophical Society of Cambridge. 1822–94.

Philosophical Transactions of the Royal Society. London, 1665–1899. Complete.

Proceedings of the Cambridge Philosophical Society. Vols. 1–9. 1843–98.

Proceedings of the Royal Society of London. 1800–98.

Acta Mathematica. Stockholm, Berlin and Paris. 1882–98.

American Journal of Mathematics. Baltimore, 1878–98.

Annales scientifiques de l'Ecole Normale Supérieure. Paris, 1864–98.

Bulletin des Sciences Mathématiques (Darboux, etc.). Paris, 1870–98.

Bulletin de la Société Mathématique de France. Paris, 1873–98.

Jahrbuch über die Fortschritte der Mathematik. Berlin, 1868–98.

Journal de l'Ecole Polytechnique, etc. Paris, 1794–1898.

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Paris, 1836–97, with registers to series I, vols. 1–15.

Journal für reine und angewandte Mathematik (Crelle, etc.). Berlin, 1726–98.

Mathematische Annalen (Clebsch, etc.). Leipzig, 1869–97.

The Oxford, Cambridge and Dublin Messenger of Mathematics. London, Cambridge, 1862–98.

Nouvelles Annales de Mathématiques. Paris, 1842–91.

Proceedings of the London Mathematical Society. London, 1865–98.

Quarterly Journal of Mathematics, pure and applied. London, 1857–98.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Vols. 34–42. Leipzig, 1888–98.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread-models of developable surfaces.

The department possesses also :

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

# II.

## PHYSICS.

This department is under the direction of Assistant Professor Arthur G. Webster, Ph. D., who will regularly deliver, with a period of two years, the following cycle of courses, not marked by stars. The starred courses have been given, or will be given at irregular intervals.

1. Dynamics.—General Methods, Canonical Equations Systems of Particles, Rigid Bodies.

2. Newtonian and Logarithmic Potential Functions, Attraction of Ellipsoids.

3. Elasticity, Hydrodynamics, Wave Motion, Dynamical Basis of Sound and Light.

3 a.* Dynamics of Cyclic and Oscillatory Systems, with Applications to Theory of Electricity, Sound and Light.

4. Electricity and Magnetism.

5. Optics, Physical and Geometrical. — Elastic and Electromagnetic Wave-theories.

5 a.* Comparison of the Theories of the Ether.

6. Thermodynamics, Thermo- and Electro-Chemistry, Kinetic Theory of Gases.

7. The Partial Differential Equations of Mathematical Physics.

Laplace's Equation, Equation of Thermal and Electrical Conduction, Equation of Wave-motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's Bessel's, and Lamé's Functions.

8.* Linear Differential Equations.

9.* Elliptic Functions, with certain physical applications.

10.* Orthogonal Surfaces and Curvilinear Co-ordinates, and their applications.

The courses for the year 1898-9 will be 1, 2, 3, 4 and 9 or 10.

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there is held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals. In addition to the lectures announced above, advanced courses may occasionally be given on subjects not included in the list of starred courses.

The aim of the department is to ensure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put to work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will at all times have the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which

exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches, and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance, may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat or electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, so

far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the Calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivatives, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation, may be recommended to the student Greenhill's, Williamson's, Byerly's, or Lamb's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus's Determinants.

It cannot be too strongly urged that the student should, from the beginning, be able to read with ease and to make use of works in French and German.

### Requirements for the Doctor's Degree.

1. The ability to read at sight specimens of scientific French and German, tested before the first of November preceding the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics,[1] and upon the subjects named above in the regular courses in Theoretical Physics, as

[1] Every student is recommended to provide himself with Winkelmann's *Handbuch der Physik* as a work for continual reference.

a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the Physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfillment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment to science to encourage research in new fields by immature and ill-prepared minds and hands.

The following statement is here inserted for the benefit of students of mathematics:

The requirements for the minor in Mathematical Physics may be fulfilled in any one of the following three ways:

1°. By attending on the lectures in course 1, as far as Rigid Bodies (about thirty lectures at the beginning of course), and courses 2 and 3 (about seventy lectures).

2°. By reading the introduction, Part I, and sections 158–161 of Dr. Webster's *Lectures on Electricity and Magnetism*, and by attending the lectures in course 3.

3°. By reading P. G. Tait's *Dynamics*, together with Chapter 4 of the above.

## Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall, the storage battery and dynamo switch-board, Dr. Webster's drop chronograph, the standard condenser and other apparatus used in determining "v," and a large electromagnet, used for researches in magnetism and diamagnetism.[1]

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it were placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires,[2] with the motor and blower used in driving it. On a second pier is a Rayleigh current-weigher for absolute determinations. The room also contains a new apparatus for the measurement of the intensity of sound in free air,[3] so sensitive that it cannot, in the daytime, be used in any other room in the building. In room B are two piers standing in front of the windows, and designed for spectroscopic work. On one of them stands a high speed motor-chronograph [4] and on the other formerly stood the absolute electrometer,[5] and at present are a Michelson interferometer, and a sensitive radiometer for radiation measurements. The room C contains the astronomical clock and balances, and in it is at present being made a research on electric waves. The room E is fitted up as a general workshop, and contains a lathe, planer, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery.

The farther end is used as a carpenter shop for pattern-mak-

---

[1] vid. Wills, Physical Review, April, 1897.
[2] vid. Saunders, Physical Review, Vol. IV, 20, 1896.
[3] vid. Webster and Sharpe, Brit. Ass'n Report, 1897.
[4] vid. Webster, Am. Jour. Sci., Vol. III, 1897.
[5] vid. Edmondson, Physical Review, Feb., 1897.

ing, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at present used for optical work. The next room is the professor's office, and also contains cases for the apparatus when not in use, together with a store-room at one end. On the walls is a large collection of blue-prints of mathematical diagrams, the originals of the figures in Dr. Webster's "Electricity and Magnetism." Here are also a number of interesting models used in the teaching of dynamics, thermo-dynamics, electricity, etc., the number of which is continually increasing, and some of which are rarely to be found. Among them are Maxwell's Dynamical Top, Rayleigh's Induction model, Gibbs's and other thermodynamical surfaces. The third room is the lecture-room, and is adorned with Rowland's great spectrum map. All the rooms are wired with several sets of wires from the switch-board, so that direct current of various voltages, and alternating current, may be had at any time.

Special mention should be made of the work-shop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied from a ten-horse power Armington & Sims engine with independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided.

## The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M.,

and any number of books may be taken out by any person, and kept ten days. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though small, is carefully selected, and while the number of volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may be fairly said to contain the best works. Among others may perhaps be mentioned:

*Collected Writings* of Helmholtz, Kirchhoff, Thomson, Green, McCullagh, Joule, Stokes, Gauss, Fourier, Laplace, Cauchy.

*Potential, Electricity and Magnetism.* Riemann, Betti, Dirichlet, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Boltzman, Mascart and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

*Elasticity.* Mathieu, Ibbetson, Love, Todhunter and Pearson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

*Hydrodynamics.* Bassett, Lamb, Kirchoff, Neumann, Poincaré.

*Light.* Mascart, Kirchhoff, Helmholtz, Neumann, Volkmann, Résal, Poincaré, Bassett, Preston.

*Heat.* Clausius, Kirchhoff, Rühlmann, Boltzman, Bertrand, Zeuner, Poincaré, Preston.

*Sound.* Rayleigh, Donkin.

A large number of treatises on Mechanics, and a set of the Mémoires et Travaux du Comité International de Poids et Mesures, may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.

Proceedings Royal Society.
Philosophical Magazine.
Physical Review.
Nature.

The library subscribes to the following journals:

American Journal of Science.
Philosophical Magazine.
Philosophical Transactions.
Proceedings Royal Society.
Physical Review.
Journal of Physical Chemistry.
Electrician.
Electrical World.
Nature.
Science.
Annalen der Physik u. Chemie.
Beiblätter " "
Zeitschrift für Instrumentenkunde.
Journal de Physique.
Comptes Rendus.

## III.

## CHEMISTRY.

No courses will be offered in this department during the year 1898-99.

# IV.

## BIOLOGY.

### Programme of Work for Year 1898–99.

Dr. Hodge will offer the following courses:

I. General Biology. This course is intended to give in general outline the fundamental principles of biological science. A general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organisms. The topics: *Methods and aims of biological research, origin of living matter, organization, growth and reproduction, heredity, differentiation* and *evolution* will be given special prominence throughout the course. One lecture weekly, Oct. to June. Laboratory work will be arranged to suit the requirements of those taking the course.

II. Comparative Study of Nervous Systems and Sense Organs. The point of view of this course will be both anatomical and physiological. It is intended to begin with a study, as far as possible comparative, of the structural elements of the nervous system in both invertebrates and vertebrates. Following this, it is proposed to consider the structure and functions of the nervous system in a series of animals, beginning with the cœlenterata and ascending through the mollusca, vermes, tunicata, arthropoda and vertebrates. The course will be illustrated, so far as possible, by diagrams, models, dissections and experiments.

In future each of the above courses will be given in extenso during alternate years, course I being given in 1898–99. Course II will be abbreviated to about six lectures during January and February.

The biological seminary will meet one evening weekly throughout the year.

## PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations and laboratory work in the following lines:

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divlsions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1898–99 will be offered as follows:

III. Physiology, Anatomy and Histology of the Human Nervous System. One hour a week throughout the year.

IV. Muscle and Nerve Physiology. This course will include reflex action. It will extend from October to January, with lectures, demonstrations, and laboratory work arranged to meet the requirements of students taking the course.

By way of supplementing the above and courses in other departments of the University, two special courses have been planned as follows:

V. Embryology and Growth of the Human Brain and

Sense Organs. Six lectures, with demonstrations and literature.

VI. Practical Histology of the Nervous System. The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. It will be arranged practically to meet the needs of individual students. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

VII. For those who do not take work in the laboratory but desire to see the actual specimens and experiments, a course of demonstrations to run somewhat parallel with the above courses will be offered. One hour weekly through the year.

## Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research,

the resources of the department are such that he will be given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and State universities, is sufficient to enable students to begin work here.

It is proposed to make a special feature of the year's work the critical study of the relations of the nervous system to the other tissues and organs of the body.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own microscopical glass, slides and covers, and must pay the cost price of all glass ware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahresberichte and Centralblätter greatly facilitates the work of referring to the literature of topics under investigation in the laboratory.

The Journal Club meets weekly, for the purpose

of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.
Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.
Jahresberichte über die Fortschritte der Anatomie und Physiologie, 1873-1898, complete.
Jahresberichte über die Fortschritte der Reinen, Pharmaceutischen und Technischen Chemie, etc., 1847-1887, complete.
Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.
Royal Society Catalogue of Scientific Papers, complete.

To the above may be added the four following taken by the Green Library, and accessible to students, viz.:

Centralblatt für die Medicinischen Wissenchaften, complete.
Morphologisches Jahrbuch, complete.
Monatsschrift, International, für Anatomie und Histologie.
Schmit's Jahrbücher der in- und ausländischen gesammten Medicin.

---

Abhandlungen der math.-phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.
Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesell schaft der Wissenchaften. Leipzig, 1852-88.
American Journal of Physiology, complete.
American Journal of Science.
American Naturalist, 1888+.
Alienist and Neurologist, 1890+.
Annales de l'Institut Pasteur. Vols. 3-5.

Arbeiten a. d. physiologischen Institut Tübingen.
Archiv für Anatomie und Physiologie, 1796, complete.
Archiv für Anatomie und Entwickelungsgeschichte, His and Braune, complete.
Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete.
Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).
Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889+.
Archiv für Mikroscopische Anatomie. (Complete set in Green Library.)
Archives de Biologie, 1889+.
Archives Italiennes de Biologie, 1889+8. (Complete set in Green Library.)
Archives de Neurologie, 1890+.
Archives de Physiologie Normale et Pathologique, 1889+.
Archives de Zoologie Expérimentale et Générale.
Beiträge zur Anatomie und Physiologie von Eckhard, 1858–88.
Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886+.
Berichte über die Leistungen in der Naturgeschichte der Niederen Thiere, 1848–53, 57–60, 61–65, 66–69, 70–71, 72–75, 76–79.
Bibliotheca Zoologica; Taschenberg Lieferungen. 1886+.
Claus Arbeiten aus dem zoologischen Institut der Universität Wien und der zoologischen Station in Trieste, 1878+.
Deutsche Zeitschrift für Nervenheilkunde, 1891+.
Internationale Monatsschrift für Anatomie und Physiologie, 1889+.
Johns Hopkins Hospital Bulletins, 1890+.
Journal de l'Anatomie et de la Physiologie, 1889+.
Journal of the Coll. of Science, Imperial University of Japan, to date.
Journal of the Marine Biological Association of the United Kingdom. Vols. I–III.
Journal of Comparative Neurology, 1891+.
Journal of Experimental Medicine, complete.
Journal of Morphology, complete.
Journal of Nervous and Mental Disease, 1890+.
Journal of Physiology, complete.

Journal of the Royal Microscopical Society, 1878–96.
Laboratoire d'Histologie du Collège de France, Années 1874, 83–88.
Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k. p. Ak. d. Wissen zu Berlin, 1882–93.
Mind, complete.
Mittheilungen aus der Zoologischen Station zu Neapel, complete.
Nature, complete.
Froriep, Notizen, 1822–36, in 50 parts; 1837–46, in 40 parts.
Pflüger's Archiv für die Gesammte Physiologie, complete.
Philosophical Society of Cambridge, Transactions, complete.
Philosophical Transactions of the Royal Society, London, 1665–98, complete with indexes.
Popular Science Monthly, 1872–98.
Proceedings of the Cambridge Philosophical Society, 1843–98.
Proceedings of the Royal Society of London, 1800–98.
Quarterly Journal of Microscopical Science, 1889–93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenger, complete.
Revue Scientifique, 1889+.
Revue de Médecine. Vols. IX–XVII.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884+.
Verhandlungen der physiologischen Gesellschaft zu Berlin, 1886+.
Zeitschrift für Biologie, 1889+.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche Medicin, 1888+.
Zeitschrift für Psychologie und Physiologie der Sinnesorgane, complete.
Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.
Zoölogical Record, 1864+.
Zeitschrift für wissenschaftliche Mikroskopie, 1889+.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

## V.

## PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory and Attention. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias, neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic below.

IV. Anthropological psychology; Myths, Custom and Belief, Comparative Religion and Psychology of Religion, Primitive Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

V. Æsthetics and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VI. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses.

VII. Applications of psychology; pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sexual problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

The PSYCHOLOGICAL LABORATORY consists of a suite of five rooms on the second floor of the main building, one large and four small. The large room is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, the third as a battery room, and the fourth as a store room for apparatus. A large room on the third floor is also used for auditory experiments and others requiring freedom from ordinary noise.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measurements. Many pieces have been manufactured at the University and a considerable number designed here for special researches. The collection is constantly increasing by purchase or construction, especially in apparatus for research.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and

especially in their current literature. The collection on Criminology and related topics is also full. The following Journals are on file at the University :

Vierteljahrsschrift für wissenschaftliche Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosphy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Philosophische Monatshefte. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophische Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Sperimentale di Freniatria e di Medicina Legale. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Archiv für systematische Philosophie. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Besides these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1898–99 the following courses will be given :

### Dr. Hall's Courses.

Dr. G. Stanley Hall will offer the following courses :—

I. The History of Ancient Philosophy.

Beginning with the Greek, with special attention to Plato and Aristotle, and including the philosophy of Christianity and the new critical school with the beginning of patristics. This course will be comprised in two to four lectures a week during the year, with references, discussions, etc.

II. Systematic Psychology.

This course will cover the chief topics in general psychology and its relation to neurology, laboratory work, and recent genetic studies.

III. Abnormal Psychology.

One hour weekly through the year.

IV. Psychological Seminary.

Weekly from seven to ten. Evenings.

Students' Lecture Courses. All students in the *Psychological Department* are expected to give one or more lectures, open to members of the University, upon topics to which they have given chief attention during the year. These courses have been both valuable and attractive.

All students in this and the Educational Department are expected to select early in the year, after conference with instructors, who will suggest and advise, some topic of research upon which special work shall be done during the year, with a view to obtaining results to be submitted for publication by the end of June.

### Dr. Sanford's Courses.

A. Experimental Psychology. This course will consist of

1. *Psychological Practicum.* Laboratory Practice and Informal Lectures on Methods, Apparatus and Results. The aim is here to familiarize the student with the most important kinds

of experimentation, and to give him a certain facility in handling standard pieces of apparatus. During the second half year the student will be assigned a problem for experimental solution under competent direction. The scope of the problems is roughly indicated by the Minor Studies published in Vols. V and VI of the *American Journal of Psychology*. Four hours a week throughout the year.

2. *Psychological Seminary*. Discussion of topics of current psychological interest; critical reading of recent literature; and short lecture courses on special topics. One hour a week throughout the year.

3. *Original Research*. Advanced students are directed in their work by Dr. Sanford in co-operation with Dr. Hall and Dr. Burnham. The laboratories are open for advanced work at times suited to the convenience of those engaged in it.

B. GENERAL PSYCHOLOGY. This course is intended primarily for students of Pedagogy and others desiring a general account of the subject. It will consist of

1. *A Course of Lectures and Demonstrations* outlining the field of normal Psychology. One hour a week throughout the year.

2. *A Laboratory Course of Pedagogical Tests and Measurements*. The purpose of this course will be to familiarize the student with those mental and bodily measurements that have been found most significant in studies of school children and college students. One hour a week till Christmas.

## ANTHROPOLOGY.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be taken up:

A. GENERAL, embracing: (a) HISTORY, scope and relations of the science of Anthropology. (b) PHYSICAL ANTHROPOLOGY. Problems, investigations, results, laboratory work. (c) ETHNOGRAPHY. Races and race-origins. (d) ETHNOLOGY, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religions. (e) LINGUISTICS. Race and language. Origin and development of language and of languages.

Psychology of language. Gesture-speech and written language. Comparative linguistics. Comparative literature. (f) CRIMINAL AND PATHOLOGICAL ANTHROPOLOGY. Ethnic morals. (g) HISTORICAL AND ARCHÆOLOGICAL. Primitive man and primitive culture.

B. SPECIAL COURSES embodying the results of the most recent and important studies and investigations in the following among other fields: Anthropometry of Children and Youth; Primitive Children and Children of Civilized Races; Education among Primitive Peoples; the emotions and their expressions among the Races of Men; the Child Mind and the Mind of Primitive Man; Myth and Child-Lore; Heredity and Adaptation; the Psychology of the Languages of Primitive Peoples; Sociology and the History of Human Institutions—the Family, the State, the Church; the Origin and Development of Civilization; Anthropological Problems and Results.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University and every effort will be made to utilize the latest results of Anthropological investigations.

From time to time, the most important current literature will be reviewed and students made acquainted with the best contributions to Anthropological science in the various foreign languages. The importance of a thorough acquaintance with the Bibliography of their subjects is impressed upon all students and all possible assistance in this direction is always at their disposal.

## COURSE IN PSYCHIATRY.

DR. ADOLF MEYER'S course covers the following ground:

1. Introductory remarks on the general biological conceptions from which the data of the course would be presented. The general biological principles applied to the study of abnormal life. Relation between neurology and psychology, neuropathology and psychiatry, neurological and psychical phenomena from the biological standpoint. Application of the point of view to alcoholic intoxication and to several forms of mental disease. Demonstra-

tion: Cases of Febrile Delirium, General Paralysis, Catatonia and Idiocy.

2. Review of the general pathology on the ground of the aspect-hypothesis. The terms disease, residual, defective formation, and defective anlage. Clinical and post-mortem pathology and their share in general pathology. Only clinical pathology furnishes data on the psychological and physiological side. Plan of clinical study. Anatomical study. Our knowledge of the macroscopic and microscopic lesions of the nervous system and the underlying pathological processes, defective nutrition, intoxications, abnormal function. Local disorders: Abnormal circulation, local intoxications, traumatic disorders, over-activity, perverted function. Demonstrations of abnormal brains and histological changes.

3. The general plan of the nervous system and illustrations of diseases of various parts (levels). The neural tube; the segmentary arrangement and the elements of the segments within the lowest level. The middle level apparatus—cerebellum, midbrain and forebrain and their afferent and efferent connections. Demonstrations: 1. Traumatic paralysis of nervous peroneus. 2. Infantile paralysis. 3. Cases of hemiplegia. 4. Lead paralysis (Remak type). 5. Alcohol neuritis. 6. Locomotor ataxia.

4. The principles of localization. The meaning of the connections of neurones by numerous collaterals, of the "interruptions of the tracts by gray matter," of the term "center." Description of the most important "centers," the lesions of the apparatus of mimic movements, the sensorimotor areas, the principal "sensory" projection fields. An outline of the principles of aphasia and its forms, of hemianopsia. Highest level symptoms. Demonstration: Hemiplegia with hemianopsia; two cases of hemiplegia with motor aphasia; one case of sensory aphasia. Reference to a case of Brown-Sequard paralysis.

5. General outline of mental diseases. Classification given last year; explanation of Kraepelin's classification. Illustration of a paradigm of mental disease; General paralysis, its etiology, symptomatology and principal types. Demonstration of six cases.

6. Toxic psychoses and psychoses on ground of disturbed

metabolism. Summary of the data of psycho-physiological study of fatigue and intoxication furnished by the school of Kraepelin. Review of the methods and the results. Application to the clinical problems. Demonstration: Delirium Tremens, Subacute Alcoholic Insanity. Cretinism. Dementia Precox and Catatonia.

7. Periodical Insanity compared with the types of Verbloedungs-processe. Demonstration of further types of Catatonia and of Periodical Insanity; "Acute Mania," "Acute Melancholia."

8. Short sketch of Senile Dementia and demonstration of a case. Constitutional psychoses. Résumé of the methods and aims of individual pschology (Cattell, Münsterberg, Jastrow, Kraepelin, Gilbert, Binet et Henri, Guicciardi and Ferrari). Value of "types" of character or constitution. Their formation. Dominant ideas. Mysophobia as a type of Neurosis of Fear. Development of Paranoia; cases of Paranoia.

## VI.

## EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of men:

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects:

I. (a) Child Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) Typical Schools and Special Foundations. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

The courses in Education for 1898–99 will be as follows :

DR. G. STANLEY HALL'S COURSE.

*Education.* The ideal school. Under this topic, grounds, buildings, school hygiene, studies, methods, teachers, etc., will be considered, and the results of child study epitomized together with other tendencies and philosophies of education in a way to show their best ideal embodiment.

One hour weekly, Saturday mornings.

This and Dr. Burnham's Saturday work constitute a teachers' course open to those not members of the University.

DR. BURNHAM'S COURSES.

A. SCHOOL HYGIENE. The fundamental principles of hygiene in regard to school buildings, heating and ventilation, lighting, school furniture, playgrounds, etc. Mental hygiene and the hygiene of instruction. The laws of nervous activity in relation to problems of instruction. Fatigue. The period of study. The hygiene of the kindergarten. The hygiene of reading, writing, arithmetic, manual training, etc. Scientific tests of mental and physical ability. School diseases, defects of sight, hearing, etc.

One hour a week throughout the year.

B. THE MODERN HISTORY OF EDUCATION. This course will involve especially the study of the modern educational movement begun by Comenius and developed by Rousseau, Pestalozzi and their followers. Such topics as the following will be studied: The influence of these reformers on educational ideals, methods, the organization of schools, and the relation of educational movements to political and social movements. The disciples and opponents of these reformers. Nature and convention. Realism and Neo-Humanism. Present problems and tendencies.

Once a week, half a year.

C. PRESENT PROBLEMS IN EDUCATION. This course will involve the discussion of such topics as the following: School administration, supervision, curricula. Questions concerning

correlation, enrichment of the course of study, elimination. The doctrine of interest. Manual training, physical exercise, gymnastics, play. Medical inspection. Methods of discipline. The school as a social organism. Recent movements in France, Germany, and England. Educational literature.

One hour a week, half a year.

D. CONFERENCE, once a week. The work will be determined in part by the needs of the individual students. It is hoped that each student will select, after conference with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

The courses as announced above may be modified somewhat as the needs of the students or other circumstances may require.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*
4. *General Surveys* and Reports on the Present Condition of Education.
5. *Standard Writers* on Education and *Biographies.*
6. *Educational Psychology.*
7. *General Works on the Theory of Education.*
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene.*
10. *The Study of Children, the Kindergarten,* etc.
11. *The State and Laws,* Civic Education, Administration and School Organization.

12. *Industrial and Technical Education.*
13. *Miscellaneous.*
14. *School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).
15. *Education of Defectives.*
16. *Art Education*, including Museums, etc.
17. *The Training of Teachers;* Examinations, etc.
18. *Moral Education* and School Discipline.
19. *University Education.*
20. *The Learned Professions.*
21. *Special Topics.*
22. *Special Reports of the Bureau of Education.*
23. *Miscellaneous Pamphlets.*
24. *Periodicals.*
25. *Miscellaneous Reports;* a, American; b, English; c, French; d, German; etc.
26. *Text-books;* a, Mathematics; b, Science; c, Drawing, etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous; i, History.
27. *Old Text-books*, with same sub-divisions as above.
28. *State and City Reports*, sub-divided by States.
29. *Charts, Maps, Pictures*, etc.
30. *Religious Education.*
31. *Nature Study.*

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society and its valuable historical material are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed, which contains a valuable collection of EDUCATIONAL

APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

### Special Students in Education.

In addition to the members of the University special students are admitted during the year, to the Saturday courses of Drs. Hall and Burnham in Education, for a fee of $25.

# LIBRARY.

The University Library contains about 17,000 bound volumes and 1,500 pamphlets, and the reading-room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

A Works of General Reference.
B Journals.
C Mathematics.
D Physics.
E Chemistry.
F Zoölogy.
G Physiology.
H Pathology.
I Psychology.
J Philosophy.
K Ethics.
L Criminology.
M Anthropology.
N Education.
O Botany.

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of Magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found :

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A Medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time ; and by the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

## LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading-room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out ; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department; and these shall be placed by themselves and marked " reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken out on Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

# BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care and that of the authorities of the University, shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty, The Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts

in behalf of the University without authority, the officer or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and co-operation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified and held for that purpose.

## REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible orders for only the kind and amount of apparatus certain to be used during the year shall be placed ; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year.

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

## PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of the University on October 2nd, 1889.

III. Register and Second Official Announcement, May, 1890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the first statement of the plan, aims and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University; pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth Official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

XIV. Summer School Programme (July 13 to 25, 1896).

XV. Register and Eighth Official Announcement, April, 1896.

XVI. Summer School Programme (July 19 to 31, 1897).

XVII. Register and Ninth Official Announcement, April, 1897.

XVIII. Summer School Programme (July 13 to 27, 1898).

## JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

THE AMERICAN JOURNAL OF PSYCHOLOGY. This Journal was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford, and E. B. Titchener (Cornell University) with the assistance of an international board of co-operators. Each volume contains four numbers of about 150 pages each. Besides original articles, a considerable portion of its space is devoted to careful digests of the important literature in its field. Price, $5 per volume ; single numbers $1.50. J. H. Orpha, publisher, Worcester, Mass.

THE PEDAGOGICAL SEMINARY. This journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 1, 2 and 3, $20.00 ; Vols. 4 and 5, $5 each. J. H. Orpha, publisher, Worcester, Mass.

THE MATHEMATICAL REVIEW. This journal, of which the first volume is in course of publication, is edited by William E. Story. Its scope includes original research in mathematics, résumés of subjects of a more elementary character, pedagogical and historical sketches and bibliographical notices. Every volume will consist of six numbers of 96 pages each. Each number contains the portrait of some distinguished mathematician. Price, $5 a volume. Published by the editor, Worcester, Mass.

# CLARK UNIVERSITY,

WORCESTER, MASS.

---

# REGISTER

AND

## Eleventh Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
April, 1899.

## CALENDAR: 1899–1900.

1899.

| | | |
|---|---|---|
| JUNE 15. | Thursday P. M. | Present academic year ends. |
| SEPT. 28. | Thursday A. M. | Eleventh academic year begins. |
| DEC. 21. | Thursday A. M. | Christmas Recess. |
| 1900. | | |
| JAN. 1. | Monday P. M. | |
| APRIL 2. | Monday A. M. | Spring Recess. |
| – 7. | Saturday P. M. | |
| JUNE 14. | Thursday P. M. | Eleventh academic year closes. |

# MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880-81; Professor of Psychology, Johns Hopkins University, 1881-88; LL. D. University of Michigan, 1888, and Williams College 1889; Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874-75; Tutor of Mathematics, Harvard University, 1875-76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888-89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889-91; Instructor in Biology, University of Wisconsin, 1891-92.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Assistant Professor of Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology, Johns Hopkins University, 1888.

HENRY TABER, PH. D., 65 West St.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888; and Assistant in Mathematics, Johns Hopkins University, 1888-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Assistant Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885-86; Parker Fellow, 1886-89; Student, Universities of Berlin, Paris, Stockholm, 1886-90; Ph. D., Berlin, 1890; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Instructor in Pedagogy.

A. B., Harvard University, 1882; Instructor in Wittenberg College, 1882-83; Instructor in the State Normal School, Potsdam, N. Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89.

ALEXANDER F. CHAMBERLAIN, PH. D., 12 Shirley St.
Lecturer in Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto, 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in German in University College, and the University of Toronto, 1888-92; Examiner in Modern Languages in the University of Trinity College, Toronto, 1890-91; Examiner in French and German, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92, and Lecturer in Anthropology, 1892; Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Fellow of the American Association for the Advancement of Science.

JOSEPH DE PEROTT, 11 Hancock St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., California, Pa.
Docent in Pedagogy.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95; Lecturer in Education, Bryn Mawr College, 1896-97; Visited European Institutions, 1897-98; Professor of Psychology and Pedagogy, State Normal School, California, Pa., 1898-99.

ADOLF MEYER, M. D., Worcester Lunatic Hospital.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91; Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95. Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

HENRY ROLFE BAKER, M. A., B. D., Fairfax, Ia.
Honorary Fellow in Psychology. 68 Florence St.

A. B., Iowa College, 1882, A. M., 1885; B. D., Yale University, 1886; Congregational Ministry, 1887; Graduate Student Andover Theological Seminary, 1889-90; Graduate Student in Philosophy and Comparative Religion, Harvard Divinity School, 1890-91; Student in Psychology, Clark University, 1894-95; Fellow, 1895-97 Hon. Fellow, 1897-98.

JAMES W. BOYCE, B. S., Barre, Vt., 37 Richards St.
Fellow in Mathematics.

B. S., University of Vermont, 1896; Fellow, Clark University, 1896-98.

FREDERICK WELTON COLEGROVE, D. D., Clinton, N. Y.,
Honorary Fellow in Psychology. 4 Charlotte St.

A. B., Colgate University, 1882; A. M., 1885; Student, Hamilton Theological Seminary, 1882-84; D. D., University of Rochester, 1893; Principal Collegiate Institute, Marion, N. Y., 1884-89; Professor of Latin, Colgate University, 1889-92; President, Ottawa University, Ottawa, Kansas, 1892-96; Honorary Fellow, Clark University, 1896-98.

HENRY H. GODDARD, A. M., Vassalboro, Me., 4 Charlotte St.
Fellow in Psychology.

A. B., Haverford College, 1887, A. M., 1889; Instructor in Latin and History, University of Southern California, 1887-88; Graduate Student, Haverford College, 1888-89; Principal Damascus Academy, Ohio, 1889-91; Instructor in Latin and Greek, Oak Grove Seminary, Vassalboro, Me., 1891-93; Principal, 1893-96; Scholar, Clark University, 1896-97; Fellow, 1897-98.

CLARK WILSON HETHERINGTON, A. B., San Diego, Cal.,
Fellow in Psychology. 70 Florence St.

A. B., Leland Stanford, Jr., University, 1895; Instructor, Encina Gymnasium, Stanford University, 1893-96; Statistician and Director of Physical Training, Whittier State (Reform) School, 1896-98.

FREDERICK H. HODGE, A. B., Fells, Mass., 10 Barbour St.
Fellow in Mathematics.

A. B., Boston University, 1894; Special Student, Bridgewater Normal School, 1894-95; Professor of Mathematics, J. B. Stetson University, 1895-96; Graduate Student in Mathematics, University of Chicago, 1896-97; Scholar, Clark University, 1897-98.

EDMUND B. HUEY, A. B., Rimersburg, Pa., 75 Florence St.
Fellow in Psychology.

A. B., Lafayette College (first honors in Philosophy and Anglo-Saxon), 1895; Instructor in Latin, Harry Hillman Academy, Wilkes-Barre, Pa., 1895-97; Scholar, Clark University, 1897-98.

JAMES EDMUND IVES, Philadelphia, Pa., 1018 Main St.
Fellow in Physics.

Assistant Curator, Academy of Natural Sciences, Pa., 1887-93; Instructor in Physics, Drexel Institute, Pa., 1893-97; Jessup Student, Academy of Natural Sciences, Pa., 1887-91; Student in Histology, and Embryology, University of Pennsylvania, 1888-89; Student in Mathematics, 1893-95; Student in Physics, Harvard University, summer of 1894; Student in Physics, Cavendish Laboratory, Cambridge, England, 1896; Scholar, Clark University, 1897-98.

LINUS WARD KLINE, B. S., Calverton, Va., 70 Florence St.
Hon. Fellow in Psychology.

L. I., Peabody Normal College, Nashville, Tenn., 1889; Principal, Hamilton Grammar School, Houston, Texas, 1891-93; B. S., Harvard University 1896; Scholar, Clark University, 1896-97; Fellow, 1897-98.

HALCOTT C. MORENO, A. M., Gainesville, Ga.,
Fellow in Mathematics. 70 Florence St.

A. B., University of Georgia, 1893; A. M., 1894; B. L., 1896; Tutor in Mathematics, 1893-97; Scholar, Clark University, 1897-98.

GEORGE E. PARTRIDGE, Worcester, Mass.,
Fellow in Psychology. 54 Hollywood St.

Special Student in Philosophy, Clark University, 1895-96; Scholar, 1896-98.

ROBERT J. RICHARDSON, B. A., Varna, Ont., Canada,
Fellow in Psychology. 2 Ripley Place.

Teacher in Public Schools, Varna, Ont., 1887-90; Graduate, Ontario School of Pedagogy, 1891; Student at Toronto University, 1891-92; Teacher in High School, Prescott, Ont., 1893-94; B. A., University of Toronto, 1897; Graduate Student, University of Toronto, 1897-98.

ERWIN W. RUNKLE, Ph. D., State College, Pa.,
Hon. Fellow in Psychology. 68 Florence St.

A. B, Western College, 1890; Graduate Student in Philosophy, Yale University, 1890-93; Lecturer on the History of Philosophy, Yale University, 1892-93; Ph. D., Yale University, 1893; Instructor in Psychology and Ethics, 1893-94, and Assistant Professor of Psychology and Ethics, Pennsylvania State College, 1894-99; Clark University, Jan., 1899.

CHARLES H. SEARS, PH. D., West Brewster, Mass.,
15 Woodland St.

Honorary Fellow in Psychology and Pedagogy.

Graduate, Four Years' Course, State Normal School, Westfield, Mass., 1883; A. M., Alleghany College, 1893, and Ph. D., 1895; Principal of Public Schools, Cheshire, Mass., 1883-85; Teacher, Prospect Park Institute, Brooklyn, N. Y., 1885-88; Teacher of Latin, State Normal School, Edinboro, Pa., 1888-92; Principal, Normal Department, Claflin University, 1892-97; Hon. Fellow, Clark University, 1897-98.

HENRY DAVIDSON SHELDON, A. M., Santa Clara, Cal.,
Fellow, and Assistant in Pedagogy. 70 Florence St.

A. B., Stanford University, 1896; A. M., 1897; Instructor in Department of Education, Stanford University, 1896-97; Fellow, Clark University, 1897-98; Lecturer in Summer School, 1898.

FREDERIC D. SHERMAN, Ph. D., Grand Rapids, Mich.,
Honorary Fellow in Psychology. 1018 Main St.

A. B., University of Michigan, 1887; Principal of Berrien Springs (Mich) School, 1887-88; Principal of Charlotte (Mich.) High School, 1888-89; Principal of Bay City High School, 1889-94; Ph. D., Leipzig, Germany, 1897; Professor of Psychology and Pedagogy, State Normal School, Oshkosh, Wis., 1897-98.

STEPHEN ELMER SLOCUM, B. E., Schenectady, N. Y.,
Fellow in Mathematics. 10 Barbour St,

B. E., Union University, 1897 (with honors in Mathematics and Physics); Scholar, Clark University, 1897-98.

WILLARD STANTON SMALL, A. M., 8 Claremont St.
Fellow in Psychology.

A. B., Tufts College, 1894; Tufts Divinity School, 1894-96; Professor of English Language and Literature, Lombard University, 1896-97; A. M., Tufts College, 1897; Scholar, Clark University, 1897-98.

CHARLES HERBERT THURBER, Chicago, Ill.,
Hon. Fellow in Pedagogy. Hotel Adams.

Ph. B., Cornell University, 1886; A. M., Haverford College, 1890; Registrar and Secretary, Cornell University, 1886-88; Teacher, Haverford College Grammar School, 1889-90; Special Agent U. S. Bureau of Education in Germany, 1890-91; Student, Royal Polytechnicum, Dresden, 1890-91; Instructor in French, Cornell University, 1891-93; Professor of Pedagogy, Colgate University, and Principal Colgate Academy, 1893-95; Director of Division of Child Study, Department of Public Instruction, N. Y. State, 1895-96; Assistant to Editor-in-Chief, Johnson's Universal Cyclopædia, 1892-94; Editor of the School Review and Illinois Transactions; Associate Professor of Pedagogy, and Dean of the Morgan Park Academy, University of Chicago, since 1896.

NORMAN TRIPLETT, A. M., Perry, Ills., 7 Gates St.
Fellow in Psychology.

A. B., Illinois College, 1889; Principal, New Berlin (Ills.) School, 1889-91; Practiced Law, 1891-94; Instructor in Physics, Chemistry and Psychology, Quincy (Ills.) High School, 1894-97; A. M., Indiana University, 1898.

JOHN N. VAN DER VRIES, A. B., Grand Rapids, Mich.,
Fellow in Mathematics. 22 May St.

A. B., Hope College, 1896; Principal of School, East Saugatuck, Mich., 1896-97; Scholar, Clark University, 1897-98.

FRANK B. WILLIAMS, M. S., Warrensburg, Mo.,
Fellow in Mathematics. 70 Florence St.

C. E., Missouri State University, 1890; Teaching Fellow in Mathematics, Missouri State University, 1892-93; M. S., Missouri State University, 1893; U. S. Asst. Engineer, Tennessee River Improvement, 1895-97; Scholar, Clark University, 1897-98.

FRANK K BAILEY, S. B., Leadville, Col., 9½ Hancock St.
Scholar in Physics.

S. B., Colorado College, 1898.

ELMER B. BRYAN, A. B., Bloomington, Ind.,
Scholar in Philosophy. 52 Hollywood St.

Graduate of Ind. State Normal, 1889; A. B., Indiana University, 1893; Principal of High School, Kokomo, Ind., 1893-94; Teacher of History, Industrial Training School, Indianapolis, 1894-96; Professor of Pedagogy, Butler College, 1896-97; Assistant Professor of Pedagogy, Indiana University, 1897-98; Graduate Student in Philosophy, Harvard University, Oct. 1898, to Jan. 1899.

ROBERT CLARK, A. B., Kingston, R. I., 23 Maywood St.
Scholar in Pedagogy.

A. B., Amherst College, 1892; Teaching, 1892-97; Scholar, Clark University, 1898.

D. ELLIS DOUTY, B. S., Seattle, Washington, 9 Wyman St.
Scholar in Physics.

B. S., University of Washington, 1892; Assistant in Physics, Laboratory University of Washington, 1895-96; Tutor in Physics, 1896-98.

LINDSAY DUNCAN, B. S., Brooklyn, N. Y., 893 Main St.
Scholar in Mathematics.

B. S., University of Maine, 1897; Scholar, Clark University, 1897-98.

FREDERICK EBY, A. B., Berlin, Ontario, 11 Freeland St.
Scholar in Pedagogy.

A. B., McMaster University, 1895; Graduate Student, University of Chicago, 1895-97; Assistant Instructor, Morgan Park Academy, Morgan Park, Ill., 1897-98.

CLEMENS JAMES FRANCE, A. B., Johnstown, N. Y.,
Scholar in Psychology. 1018 Main St.

A. B., Hamilton College, 1898.

S. B. HASLETT, A. B., Wilkinsonville, Mass.
Scholar in Psychology.

Graduate of the Edinboro (Pa.) State Normal School, 1885; Principal of Creighton (Pa.) Public Schools, 1887-88; A. B., Grove City College, Pa., 1889; Principal Braddock High School, 1890-91; Graduate Allegheny Theological Seminary, 1892; A. M., Grove City College, 1896; Presbyterian Ministry, 1892-98.

ELWYN N. LOVEWELL, PH. B., Bradford, Vt.,
Scholar in Mathematics. 9 Oread Place.

Ph. B., University of Vermont, 1898. (With double honors.)

FRANK H. McASSEY, A. B., Windsor, Mo., 9 Wyman St.
Scholar in Psychology.

A. B., Ripon College, Ripon, Wis., 1897.

ROLLA R. RAMSEY, A. M., Morning Sun, O.,
Scholar in Physics. 36 Kingsbury St.

A. B., Dept. of Physics, Indiana University 1895; A. M., 1898; Assistant in Shop, Dept. of Physics, Indiana University, 1894-95: Science Teacher, Decatur (Ind.) High School, 1895-96: Laboratory Assistant, Dept. of Physics, Indiana University. 1896-97; Professor of Physics, Westminster College, New Wilmington, Pa., 1897-98.

LOUIS SIFF, S. B., Ithaca, N. Y., 18 Gates St.
Scholar in Mathematics.

S. B., Cornell University, 1897 (with special mention in Mathematics); Graduate Student, Johns Hopkins University, Oct., 1897 to Feb., 1898.

ORLANDO S. STETSON, Franklin, Mass., 18 Gates St.
Scholar in Mathematics.
Worcester Polytechnic Institute, 1896-98.

A. HARRY WHEELER, S. B., Worcester, Mass.,
Scholar in Mathematics. 8 Shawmut St.
S. B., Worcester Polytechnic Institute, 1894; Instructor in Mathematics, English High School, Worcester, Mass., 1894 to Dec., 1896; Scholar in Mathematics, Clark University, 1896-98.

---

## Special Students Attending the Saturday Morning Teachers' Course.

*H. G. BENNEYAN (Euphrates College, Turkey,),
Pastor of the Armenian Cong'l Church, Worcester, Mass.

ANNA L. BROWN, M. D.,
Northfield Training School, East Northfield, Mass.

ANNE GERTRUDE CHILDS, A. M.,
Worcester, Mass.

*GEORGE F. COLE, A. M.,
Instructor in Modern Languages, English High School, Worcester, Mass.

*STEPHEN S. COLVIN, Ph. D.,
Instructor in English, English High School, Worcester, Mass.

ALBERT GRAY,
Instructor in Greek History, English High School, Worcester, Mass.

*ABBY CALISTA HALE,
Teacher, Downing St. School, Worcester, Mass.

LILA S. HALSEY,
Principal Northfield Training School, East Northfield, Mass.

ARTHUR P. IRVING, A. B.,
Supt. of Schools, Ayer and West Boylston, Mass.

*H. W. SMITH,
Worcester, Mass.

*PRESTON SMITH,
Science Teacher, State Normal School, Fitchburg Mass.

GEORGE H. STODDARD, A. M.,
Principal, High School, East Douglas, Mass.

---

LOUIS N. WILSON,
Librarian and Clerk of the University. 11 Shirley St.

*Taking work in other courses.

# ADMINISTRATION.

The trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively through the three committees named below, and also through the President of the University.

## BOARD OF TRUSTEES.

JONAS G. CLARK,

STEPHEN SALISBURY,
GEORGE F. HOAR,
WILLIAM W. RICE,*
EDWARD COWLES,
JOHN D. WASHBURN,
FRANK P. GOULDING,
GEORGE SWAN,
THOMAS H. GAGE.

## OFFICERS.

| | |
|---|---|
| President, - - - | JONAS G. CLARK, |
| Vice-Presidents, - - | GEORGE F. HOAR, WILLIAM W. RICE,* |
| Treasurer, - - - | THOMAS H. GAGE, |
| Secretary, - - - | FRANK P. GOULDING. |

## COMMITTEES.

*Finance.*

JONAS G. CLARK,
JOHN D. WASHBURN,
STEPHEN SALISBURY,
THOMAS H. GAGE.

*Buildings.*

JONAS G. CLARK,
STEPHEN SALISBURY.

*By-Laws.*

JONAS G. CLARK,

WILLIAM W. RICE,*
JOHN D. WASHBURN,
STEPHEN SALISBURY,
GEORGE SWAN.

*Died March 1st, 1896.

## President.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent, or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the corporation Sept. 26, 1889.

## FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

### I. University Senate.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangement, cataloguing and use of books and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

# GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:

I. Mathematics.
II. Physics.
III. Chemistry.
IV. Biology.
V. Psychology.

In addition to these *Education* is now a subdepartment of Psychology.

## Admission.

Graduate students only are admitted, or those of equivalent attainments, except in rare and special cases. At present no entrance examinations are required; but by testimonials, diplomas, personal interviews, or written specimens of work, the authorities must be satisfied that the applicant has scholarship enough to work to advantage, and zeal and ability enough to devote himself to his chosen field. The methods of the University are too costly, and its energy and funds too pre-

cious, to be spent upon men who are not well trained, promising and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges, and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief as well as the best work of this University is individual, and involves daily suggestion, encouragement and direction.

## Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits his power in teaching.

### I. Docents.

The highest annual appointment is that of Do-

cent. These positions are primarily honors, and are reserved for a few men whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their department, their time will be mainly reserved for study and research in a way best adapted to qualify them still more fully for academic advancement.

These positions are now official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can now be furnished on application and which requires a memoir or essay representing original work in their own department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability, and so far as this diploma can have the significance of a title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that by the existence of such a

select body of men of guaranteed scientific training, ability and approved power to teach, the difficulties under which college trustees sometimes succumb in selecting suitable men as their professors may be diminished, and that otherwise this new grade will aid in raising standards of academic scholarships in colleges and in encouraging scientific research here. Good men of this class may be paid a salary.

## II. Candidates for the Degree of Doctor of Philosophy.

In most cases three, or at least two, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time during the academic year when, in the judgment of the University authorities, the candidate is prepared. A prearranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a dissertation upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be reported on in writing by the chief instructor before the examination, printed at the expense of the candidate, and at least one hundred copies

given to the University. In case, however, of dissertations of very unusual length, or containing very expensive plates, the Faculty shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty.

Such formal or informal tests as the Faculty shall determine, shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede by at least one academic year the examination itself. (See special rules below.)

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the dissertation must be in the hands of the Librarian before the diploma is given. In exceptional cases, however, and by special action of the Faculty, the ceremony of promotion may precede the presentation of the printed copies of the dissertation. The latter, however, must always precede the actual presentation of the diploma.

An oral but not a written examination is required upon at least one minor subject in addition to the major, before an examination jury composed of at least four members, including the

head of the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examination to the Faculty, which, if it is also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard of requirements for it be kept the highest practicable, that it be reserved for men of superior ability and attainment only, and that its value here be never suffered to depreciate.

It is to the needs of these students that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are primarily intended, although any of these honors may be awarded to others.

## Special Rules Concerning the Doctor's Degree.

I. *Residence.* No candidate shall receive the degree of Doctor of Philosophy without at least one year's previous residence.

II. *Candidature for the Doctor's Degree.* Every applicant for the doctor's degree shall fill out before October fifteenth the regular application blank provided at the office. This schedule shall be submitted to the head of the department and the instructor in the major subject. Before affixing their signatures they shall satisfy themselves, in such manner as they may desire, as to the fitness of the applicant.

III. When countersigned, this schedule shall be filed with the President, who will appoint an examiner to serve with a representative of the major subject as a committee to determine the proficiency of the applicant in French and German.

IV. In case of a favorable report by this committee the applicant shall be a regular candidate for the degree.

V. Candidates complying with all preliminary conditions, including the examinations in French and German, before November first, will be allowed to proceed to the doctor's examination at any time between May fifteenth following and the end of the academic year.

VI. Dissertations must be presented to the instructor under whose direction the dissertation is written, and reported upon by him before the

doctor's examination. In every case the dissertation shall be laid before the jury of examination, at the time of examination, in form suitable for publication. This provision shall not, however, preclude the making of such minor changes later as the chief instructor may approve.

VII. The dissertation shall be printed at the expense of the candidate and the required copies deposited with the Librarian within one calendar year after the first of October following the examination. The candidate alone will be held responsible for the fulfillment of these conditions.

VIII. The favorable report of the chief instructor, filed in writing with the Clerk of the University, shall be a sufficient imprimatur or authorization for printing as a dissertation. The printed copies shall bear upon the cover the statement of approval in the following words, over the name of the chief instructor:

A Dissertation submitted to the Faculty of Clark University, Worcester, Mass., in partial fulfillment of the requirements for the degree of Doctor of Philosophy, and accepted on the recommendation of (Name of the chief instructor).

IX. *Examinations for the Doctor's Degree.* The examinations for the doctor's degree may be held at any time during the academic year,

provided that at least one academic year has elapsed since the completion of the preliminaries of candidature, except in the case of fulfillment of these conditions between the beginning of any academic year and November first of that year, to which case Rule V applies. The examinations shall be held at such hours and places as the President may appoint.

X. Examinations may also be held during the regular vacations of the University, but for these an additional fee of five dollars to each examiner, and the reasonable travelling expenses of any examiners who are out of town, all payable in advance, will be required.

XI. All these special rules shall go into force immediately as far as practicable, and shall govern all applicants for degrees in the academic year 1899–1900.

## III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the University, may also be received. This class includes persons who may desire to devote themselves exclusively to one or more of the special

branches — mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to matriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

### IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes, who are nearly, if not quite qualified to become candidates for the degree of Doctor of Philosophy, may also be received.

Students of this class must for the present have completed the work of the first three years of a regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their

attainments, and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

### Fellowships and Scholarships.

Until two years ago the sum of $4,800 was devoted to Fellowships. The plan then was to thus provide for eight Senior Fellows at $400 each, and eight Junior Fellows at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 was remitted, thus making the value of these Fellowships $600 and $400 each, respectively.

Besides these, sixteen other appointments were made, viz.: eight Senior University Scholarships, remitting all the fee, and eight Junior University Scholarships, remitting one-half the fee.

While the University desires to continue this plan, it was able last year only to approximate it as far as the reduced funds available for this purpose permitted. For next year the same conditions seem likely to prevail. The significance of Junior and Senior Fellowships and Scholarships will, therefore, remain unchanged, but the income of the appointments must be diminished.

## A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

## The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

## Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three

learned professions, although the latter are not excluded.

Applications should state the candidate's course of study, and be accompanied by testimonials or diplomas; should indicate a decided preference for some special department, and, if possible, be accompanied, for the aid of the Board of Selection, by some specimen of his work. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during the year. The names of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the entire academic year and devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must co-operate in promoting harmony, order, and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Being intended primarily as honors, both Fellowships and Scholarships are awarded without reference

to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

## METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each instructor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus and reference to standard text-books, and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will from time to time be given.

SEMINARIES. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual read-

ing are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceded, and the efficiency of universities has been greatly increased.

Laboratory Work. For beginners this has been from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators are tested, methods discussed and perfected, with a view to developing that independence in research which is the consummation of scientific culture.

## NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $200 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will be given information, so far as possible, upon any of these or other points, in advance of official announcement, upon

addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendance to its close.

The following are the statements and announcements of the departments for the academic year, 1899–1900.

# I.

## MATHEMATICS.

### Programme for 1899–1900.

### INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is given by means of introductory, advanced, and special

courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

*Group* A:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Theory of Functions of Real and Imaginary Variables, and Definite Integrals; 3 hours a week, through the year.

Theory of Numbers; 2 hours a week, one half-year.

Modern Synthetic Geometry; 2 hours a week, one half-year.

*Group* B:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Elliptic Functions, Differential Equations, and Calculus of Variations; 3 hours a week, through the year.

Algebraic Substitutions and their Application to the Theory of Equations; 2 hours a week, one half-year.

Analytic Geometry of Higher Surfaces and Twisted Curves; 2 hours a week, one half-year.

Algebraic Invariants; 2 hours a week, one half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the present day. Thus, for example, the conic sections and

quadric surfaces are treated by modern methods from the beginning, with adequate consideration of the discoveries of the great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

*Special advanced courses*, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the degree of Doctor of Philosophy.

---

For the academic year 1899–1900, the following courses are offered:

BY PROFESSOR STORY.

Advanced courses:

SIMULTANEOUS EQUATIONS, INCLUDING RESTRICTED SYSTEMS; 2 hours a week, first half-year.

DIFFERENTIAL GEOMETRY; 3 hours a week, second half-year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory courses:

ALGEBRAIC INVARIANTS; 2 hours a week, second half-year.

ANALYTIC GEOMETRY OF HIGHER SURFACES AND TWISTED CURVES; 3 hours a week, first half-year.

BY ASSISTANT PROFESSOR TABER.

Introductory courses:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

ELLIPTIC FUNCTIONS, DIFFERENTIAL EQUATIONS, AND CALCULUS OF VARIATIONS; 3 hours a week, through the year.

FINITE CONTINUOUS GROUPS.

SEMINARY; through the year.

BY ASSISTANT PROFESSOR WEBSTER.

[See announcement of Department of Physics, courses 8, 9, 10.]

BY M. DE PEROTT.

Introductory courses:

THEORY OF NUMBERS; 2 hours a week, first half-year.

ALGEBRAIC SUBSTITUTIONS AND THEIR APPLICATION TO THE THEORY OF EQUATIONS; 2 hours a week, second half-year.

---

During the academic years 1889-99, advanced and special courses have been given in:

1. THE HISTORY OF ARITHMETIC AND ALGEBRA among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.
3. LINEAR TRANSFORMATIONS AND ALGEBRAIC INVARIANTS, with applications to algebraic equations and geometry.
4. THEORY OF SUBSTITUTIONS, with applications to algebraic equations.
5. PLANE ANALYTIC GEOMETRY.
6. SOLID ANALYTIC GEOMETRY.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass's Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general theory of linear differential equations, Gauss's, Legendre's, and Bessel's functions.

30. Partial Differential Equations, including Laplace's, Bessel's, and Lamé's functions.

31. Finite Differences and Probabilities.

32. Applications of the Infinitesimal Calculus to the Theory of Surfaces.

33. Simultaneous Equations, including Restricted Systems.

34. Theory of Transformation Groups.

35. The Application of Transformation Groups to Differential Equations.

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors ; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible, to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several

instructors, and those who have attained the necessary proficiency are personally directed in individual researches, of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented memoirs embodying the results of original investigation that receive the approval of the head of the department, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University.[1] Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

## MATERIAL FACILITIES.

The library is provided with the more important text-books, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any considerable extent to mathematics. Among the period-

[1] For requirements see p. 43.

icals of which the library has complete or nearly complete sets are the following :

Abhandlungen der Math.-Phys. Classe der Königl. Sächsischen Gesellschaft der Wissenschaften. Vols. 1-14. Leipzig, 1852-88.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences. Paris, 1835 to date. Complete.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892 to date.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 1853-88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798 to date. Complete.

Transactions of the Philosophical Society of Cambridge. 1822 to date. Complete.

Philosophical Transactions of the Royal Society. London, 1665 to date. Complete.

Proceedings of the Cambridge Philosophical Society. 1843 to date. Complete.

Proceedings of the Royal Society of London. 1800 to date. Complete.

Acta Mathematica. Stockholm, Berlin and Paris. 1882 to date. Complete.

American Journal of Mathematics. Baltimore, 1878 to date. Complete.

Annales scientifiques de l'Ecole Normale Supérieure. Paris, 1864 to date. Complete.

Bulletin des Sciences Mathématiques (Darboux, etc.). Paris, 1870 to date. Complete.

Bulletin de la Société Mathématique de France. Paris, 1873 to date. Complete.

Jahrbuch über die Fortschritte der Mathematik. Berlin, 1868 to date. Complete.

Journal de l'Ecole Polytechnique, etc. Paris, 1794 to date. Complete.

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Paris, 1836 to date. Complete.

Journal für reine und angewandte Mathematik (Crelle, etc.). Berlin, 1826 to date. Complete.

Mathematische Annalen (Clebsch, etc.). Leipzig, 1869 to date. Complete.

Messenger of Mathematics, Oxford, Cambridge, and Dublin. 1862 to date. Complete.

Nouvelles Annales de Mathématiques. Paris, 1842–91.

Proceedings of the London Mathematical Society. London, 1865 to date. Complete.

Quarterly Journal of Mathematics, pure and applied. London, 1857 to date. Complete.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Leipzig. Vols. 34–42, 1888–98. Complete from Vol. 34 (1888) to date.

Revue semestrielle des Publications Mathématiques. Amsterdam, 1893 to date. Complete.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread models of developable surfaces.

The department possesses also:

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

## II.

## PHYSICS.

ASSISTANT PROFESSOR WEBSTER will regularly deliver, with a period of two years, the following cycle of unstarred courses. The starred courses have been given, or will be given at irregular intervals.

1. DYNAMICS. GENERAL PRINCIPLES, CANONICAL EQUATIONS, METHODS OF HAMILTON AND JACOBI, SYSTEMS OF PARTICLES, RIGID BODIES.

2. NEWTONIAN AND LOGARITHMIC POTENTIAL FUNCTIONS, ATTRACTION OF ELLIPSOIDS.

3. ELASTICITY, HYDRODYNAMICS, WAVE AND VORTEX MOTION, DYNAMICAL BASIS OF SOUND AND LIGHT.

3 a.* DYNAMICS OF CYCLIC AND OSCILLATORY SYSTEMS, WITH APPLICATIONS TO THEORY OF ELECTRICITY, SOUND AND LIGHT.

4. ELECTRICITY AND MAGNETISM.

5. OPTICS, PHYSICAL AND GEOMETRICAL. ELASTIC AND ELECTROMAGNETIC WAVE-THEORIES.

5 a.* COMPARISON OF THE THEORIES OF THE ETHER.

6. THERMODYNAMICS, THERMO- AND ELECTRO-CHEMISTRY, KINETIC THEORY OF GASES, RADIATION.

7. THE PARTIAL DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS.

Laplace's Equation, Equation of Thermal and Electrical conduction, Equation of Wave-motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's, Bessel's, and Lamé's Functions.

8.* LINEAR DIFFERENTIAL EQUATIONS.

9.* ELLIPTIC FUNCTIONS, with certain physical applications.

10.* ORTHOGONAL SURFACES AND CURVILINEAR CO-ORDINATES, and their applications.

The courses for the year 1899-1900 will be 5, 5 a, 6, 7, 8. (1, 2, 3, 4, 9 and 10 have been given this year).

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there is held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals.

A part of the work of the colloquium consists in the systematic presentation of certain classical researches, connected more or less with the lectures, in preparing which the students make use of the original sources of information, thus gaining much experience in methods of research. The work of the colloquium has an excellent effect in training students to present their ideas in a systematic manner before an auditory.

In addition to the lectures announced above, advanced courses may occasionally be given on subjects not included in the list of starred courses.

The aim of the department is to insure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put at work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has

been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will have at all times the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches, and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat or electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the

geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, so far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivative, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation may be recommended to the student Greenhill's, Williamson's, Byerly's, or Lamb's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus's Determinants.

It cannot be too strongly urged that the student should, from the beginning, be able to read with ease and to make use of works in French and German.

## Requirements for the Doctor's Degree.

1. The ability to read at sight specimens of scientific French and German, tested before the first of November preceding the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics,[1] and upon the subjects named above in the regular course in Theoretical Physics, as a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfillment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment to science to encourage research in new fields by immature and ill-prepared minds and hands.

---

[1] Every student is recommended to provide himself with Winkelmann's *Handbuch der Physik* as a work for continual reference.

The following statement is here inserted for the benefit of students of mathematics:

The requirements for the minor in Mathematical Physics may be fulfilled in any one of the following three ways:

1°. By attending the lectures in course 1, as far as Rigid Bodies (about thirty-five lectures at the beginning of course), and courses 2 and 3 (about seventy lectures).

2°. By reading the introduction, Part I, and sections 158–161 of Dr. Webster's *Lectures on Electricity and Magnetism*, and by attending the lectures in course 3.

3°. By reading P. G. Tait's *Dynamics*, together with Chapter 4 of the above.

## Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall, the storage battery and dynamo switch-board, Dr. Webster's drop chronograph,[1] the standard condenser and other apparatus used in determining "v," and a large electromagnet, used for researches in magnetism and diamagnetism.[2]

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it were placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires,[3] with the motor and blower used in driving it. On a second pier is a Rayleigh current-weigher for absolute determinations.[4] The room also contains a new apparatus for the measurement of the intensity of sound in free air,[5] so sensitive that it cannot, in the daytime, be used in any other room in the build-

[1] vid. Webster, Physical Review, Vol. VI, 5, 1898.
[2] vid. Wills, Physical Review, April, 1897.
[3] vid. Saunders, Physical Review, Vol. IV, 20, 1896.
[4] vid. Taylor, Physical Review, Vol. VII, 31, 1898.
[5] vid. Webster and Sharpe, Brit. Ass'n Report, 1897.

ing. It is also fitted up as a photographic dark room. In room B are two piers standing in front of the windows, and designed for spectroscopic work. On one of them stands a high speed motor-chronograph[1] and on the other formerly stood the absolute electrometer,[2] and at present are a Michelson interferometer, and a sensitive radiometer for radiation measurements. The room C contains the astronomical clock and balances, and is now used for electrical measurements. The room E is fitted up as a general workshop, and contains a lathe, planer, jeweller's lathe for lapidary work, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery.

The farther end is used as a carpenter shop for pattern-making, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at present used for optical work. The next room is the professor's office and also contains cases for the apparatus when not in use, together with a store-room at one end. On the walls is a large collection of blue-prints of mathematical diagrams, the originals of the figures in Dr. Webster's "Electricity and Magnetism." Here are also a number of interesting models used in the teaching of dynamics, thermo-dynamics, electricity, etc., the number of which is continually increasing, and some of which are rarely to be found. Among them are Maxwell's Dynamical Top and several other interesting tops, Rayleigh's Induction model, Gibbs's and other thermodynamical surfaces. The third room is the lecture-room, and is adorned with Rowland's great spectrum map. All the rooms are wired with several sets of wires from the switch-board, so that direct current of various voltages, and alternating current, may be had at any time.

Special mention should be made of the work-shop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied from a ten-horse power Armington & Sims engine with

[1] vid. Webster, Am. Jour. Sci., Vol. III, 1897.
[2] vid. Edmondson, Physical Review, Feb., 1897.

independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. Many of the principal pieces of apparatus belonging to this department have been here constructed. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided.

## The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M., and any number of books may be taken out by any person, and kept ten days. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though not imposing as regards size, is carefully selected, and while the number of volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may fairly be said to contain the best works. Among others may perhaps be mentioned:

*Collected Writings* of Helmholtz, Kirchhoff, Thomson, Green, McCullagh, Joule, Stokes, Gauss, Fourier, Laplace, Cauchy.

*Potential, Electricity and Magnetism.* Riemann, Betti, Dirichlet, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Boltzman, Mascart, and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

*Elasticity.* Mathieu, Ibbetson, Love, Todhunter and Pearson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

*Hydrodynamics.* Bassett, Lamb, Kirchoff, Neumann, Poincaré.

*Light.* Mascart, Kirchhoff, Helmholtz, Neumann, Volkmann, Résal, Poincaré, Bassett, Preston.

*Heat.* Clausius, Kirchhoff, Rühlmann, Boltzman, Bertrand, Zeuner, Poincaré, Preston.

*Sound.* Rayleigh, Donkin.

A large number of treatises on Mechanics, and a set of the mémoires et Travaux du Comité International de Poids et Mesures, may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.
Proceedings Royal Society.
Philosophical Magazine.
Physical Review.
Nature.

The library subscribes to the following journals:

American Journal of Science.
Philosophical Magazine.
Philosophical Transactions.
Proceedings Royal Society.
Physical Review.
Journal of Physical Chemistry.
Electrician.
Electrical World.
Nature.
Science.
Annalen der Physik u. Chemie.
Beiblätter zu den Annalen der Phys. u. Chemie.
Zeitschrift für Instrumentenkunde.
Verhandlungen der Deutschen Physikalischen Gesellschaft.
Journal de Physique.
Comptes Rendus.

## III.

### CHEMISTRY.

No courses will be offered in this department during the year 1899-1900.

# IV.

## BIOLOGY.

### Programme of Work for Year 1899–1900.

Dr. Hodge will offer the following courses:

I. General Biology. This course is intended to give in general outline the fundamental principles of biological science. A general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organisms. The topics: *Methods and aims of biological research, origin of living matter, organization, growth and reproduction, heredity, differentiation* and *evolution* will be given special prominence throughout the course. One lecture weekly, Oct. to June. Laboratory work will be arranged to suit the requirements of those taking the course.

II. Comparative Study of Nervous Systems and Sense Organs. The point of view of this course will be both anatomical and physiological. It is intended to begin with a study, as far as possible comparative, of the structural elements of the nervous system in both invertebrates and vertebrates. Following this, it is proposed to consider the structure and functions of the nervous system in a series of animals, beginning with the cœlenterata and ascending through the mollusca, vermes, tunicata, arthropoda and vertebrates. The course will be illustrated, so far as possible, by diagrams, models, dissections and experiments.

In future each of the above courses will be given in extenso during alternate years, course II being given in 1899–1900. Course I will be abbreviated to about six lectures during January and February.

The biological seminary will meet one evening weekly throughout the year.

## PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations and laboratory work in the following lines:

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divisions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1899–1900 will be offered as follows:

III. Physiology, Anatomy and Histology of the Human Nervous System. One hour a week throughout the year.

IV. Physiology of Nutrition.

V. Physiology of Reproduction.

By way of supplementing the above and courses in other departments of the University, three special courses have been planned as follows:

VI. Embryology and Growth of the Human Brain and Sense Organs. Six lectures, with demonstrations and literature.

VII. Practical Histology of the Nervous System. The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. It will be arranged practically to meet the needs of individual students. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

VIII. For those who do not take work in the laboratory, but desire to see the actual specimens and experiments, a course of demonstrations to run somewhat parallel with the above courses will be offered. One hour weekly through the year.

## Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research, the resources of the department are such that he will be

given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and State universities, is sufficient to enable students to begin work here.

It is proposed to continue and enlarge upon the line of work specially undertaken last year in making a critical study of the relations of the nervous system to the other tissues and organs of the body.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own miccroscopical glass, slides and covers, and must pay the cost price of all glassware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahresberichte and Centralblätter greatly facilitates the work of referring to the literature of topics under investigation in the laboratory.

The Journal Club meets weekly, for the purpose

of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.
Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.
Jahresberichte über die Fortschritte der Anatomie und Physiologie (1873). Complete.
Jahresberichte über die Fortschritte der Reinen Pharmaceutischen und Technischen Chemie, etc., 1847-1887.
Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.
Royal Society Catalogue of Scientific Papers, complete.

To the above may be added the four following taken by the Green Library, and accessible to students, viz.:

Centralblatt für die Medicinischen Wissenchaften, complete.
Morphologisches Jahrbuch, complete.
Monatsschrift, International, für Anatomie und Histologie.
Schmit's Jahrbücher der in-und ausländischen gesammten Medicin.

---

Abhandlungen der math.- phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.
Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesell schaft der Wissenchaften. Leipzig, 1852-88.
American Journal of Physiology, complete.
American Journal of Science.
American Naturalist, 1888–1897.
Alienist and Neurologist, 1890 to date.
Annales de l'Institut Pasteur. Vols. 3-5.

Arbeiten a. d. physiologischen Institut Tübingen.
Archiv für Anatomie und Physiologie (1796), complete.
Archiv für Anatomie und Entwickelungsgeschichte, His and Braune, complete.
Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete.
Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).
Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889 to date.
Archiv für Mikroscopische Anatomie. (Complete set in Green Library.)
Archives de Biologie, 1889 to date.
Archives Italiennes de Biologie. (Complete set in Green Library.)
Archives de Neurologie, 1890 to date.
Archives de Physiologie Normale et Pathologique, 1889 to date.
Archives de Zoölogie Expérimentole et Générale.
Beiträge zur Anatomie und Physiologie von Eckhard, 1858–88.
Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886 to date.
Berichte über die Leistungen in der Naturgeschichte der Niederen Thiere, 1848–53, 57–60, 61–65, 66–69, 70–71, 72–75, 76–79.
Bibliotheca Zoölogica; Taschenberg Lieferungen. 1886+.
Claus Arbeiten aus dem zoölogischen Institut der Universität Wien und der zoölogischen Station in Trieste, 1878.
Deutsche Zeitschrift für Nervenheilkunde, 1891 to date.
Internationale Monatsschrift für Anatomie und Physiologie, 1889 to date.
Johns Hopkins Hospital Bulletins, 1890 to date.
Journal de l'Anatomie et de la Physiologie, 1889 to date.
Journal of the Coll. of Science, Imperial University of Japan, to date.
Journal of the Marine Biological Association of the United Kingdom. Vols. I–III.
Journal of Comparative Neurology, 1891 to date.
Journal of Experimental Medicine, complete.
Journal of Morphology, complete
Journal of Nervous and Mental Disease, 1890 to date.

Journal of Physiology, complete.
Journal of the Royal Microscopical Society, 1878–96.
Laboratoire d'Histologie du Collège de France, Années 1874, 83–88.
Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k. p. Ak. d. Wissen zu Berlin, 1882–93.
Mind, complete.
Mittheilungen aus der Zoölogischen Station zu Neapel, 1879–88. Vols. I–IX.
Nature, complete.
Froriep, Notizen, 1822–36, in 50 parts; 1837–46, in 40 parts.
Pflüger's Archiv für die Gesammte Physiologie, complete.
Philosophical Society of Cambridge, Transactions, complete.
Philosophical Transactions of the Royal Society, London (1665), complete with indexes.
Popular Science Monthly, complete.
Proceedings of the Cambridge Philosophical Society (1843). Complete.
Proceedings of the Royal Society of London (1800). Complete.
Quarterly Journal of Microscopical Science, 1889–93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenge. Complete.
Revue Scientifique, 1889 to date.
Revue de Médecine. Vol. IX to date.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884 to date.
Verhandlungen der physiologischen Gesellschaft zu Berlin, 1886 to date.
Zeitschrift für Biologie, 1889 to date.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche Medicin, 1888 to date.
Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Complete.
Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.

Zoölogical Record, 1864 to date. Complete.
Zeitschrift für wissenschaftliche Mikroskopie, 1889 to date.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

## V.

## PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes, with a good general background of Crityz. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory, Attention, Association, Will, Feelings, etc. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Comparative and gentic psychology. Observation and experiments upon the mental processes of lower animals, including both microscopical and larger forms, and especially (when practical) the observation of dawning intelligence during animal infancy; questions of instinct and Psychical Heredity; and in general the parts of the general field common to biology and psychology. See announcements of Dr. Hall and Dr. Sanford.

IV. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies, and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias, neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic below.

V. Anthropological psychology; Myths, Custom and Belief, Comparative Religion and Psychology of Religion, Primitive Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

VI. Æsthetics and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VII. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses.

VIII. Applications of psychology; pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sexual problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

THE PSYCHOLOGICAL LABORATORY consists of a suite of five rooms on the second floor of the main building (one large and four small), together with another on the third floor. The large room is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, the third as a battery room, and the fourth as a store room for apparatus. The large room on the third floor is also used for comparative psychology.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measure-

ments. Many pieces have been manufactured at the University and a considerable number designed here for special researches. The collection is constantly increasing by purchase or construction, especially in apparatus for research.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and especially in their current literature. The collection on Criminology and related topics is also full. The following Journals are on file at the University:

Archiv für Systematische Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosophy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophische Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Sperimentale di Freniatria e di Medicina Legale. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Besides these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. American Journal of Physiology. Journal of Experimental

Medicine. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1899-1900 the following courses will be given:

DR. HALL'S COURSES.

Dr. G. Stanley Hall will offer the following courses:

I. THE HISTORY OF MEDIÆVAL AND MODERN PHILOSOPHY.

Beginning with the close of scholasticism and coming to the present time. This course will be comprised in two lectures a week during the year, with references, discussions, readings, etc.

II. GENETIC AND COMPARATIVE PSYCHOLOGY.

III. ABNORMAL PSYCHOLOGY.

One hour weekly through the year.

IV. PSYCHOLOGICAL SEMINARY.

Weekly from seven to ten. Evenings.

STUDENTS' LECTURE COURSES. All students in the *Psychological Department* are expected to give one or more lectures, open to members of the University, upon topics to which they have given chief attention during the year. These courses have been both valuable and attractive.

All students in this and the Educational Department are expected to select early in the year, after conference with instructors, who will suggest and advise, some topic of research upon which special work shall be done during the year, with a view to obtaining results to be submitted for publication by the end of June.

### Dr. Sanford's Courses.

A. Experimental and Comparative Psychology. This course will consist of the following:

1. *Psychological Practicum.* Laboratory Practice and Demonstrations with Informal Lectures on Methods, Apparatus, and Results. The aim here is to familiarize the student with the most important kinds of psychological experimentation and to give him a certain facility in handling ordinary apparatus. The experiments upon the senses are selected from Dr. Sanford's "Course in Experimental Psychology;" those upon the time relations of mental phenomena, fatigue, and circulation and respiration are of a similar character. Four hours a week from October to April.

2. *Comparative Psychology.* Microscopic Forms, Ants, Fish, Chick, White Rat and Kitten, will be observed and subjected to simple experiments. Four hours a week from April to the end of the year.

Both these courses will be given by qualified assistants under the immediate supervision and with the co-operation of Dr. Sanford.

B. General Psychology. This course is intended primarily for students of Pedagogy and others desiring a general and elementary account of the subject. Text book, lectures and demonstrations. One hour a week throughout the year.

C. Advanced Psychology.

1. *Psychological Seminary.* Short lecture courses on special topics: critical reading of recent literature; and discussion of topics of current psychological interest. One to two hours a week throughout the year.

2. *Original Research.* Advanced students are directed in their work by Dr. Sanford in co-operation with Dr. Hall and Dr. Burnham. The laboratories are open for advanced work at times suited to the convenience of those engaged in it.

### Course In Psychiatry.

Dr. Adolf Meyer's course covers the following ground:

1. Introductory remarks on the general biological concep-

tions from which the data of the course would be presented. The general biological principles applied to the study of abnormal life. Relation between neurology and psychology, neuropathology and psychiatry, neurological and psychical phenomena from the biological standpoint. Application of the point of view to alcoholic intoxication and to several forms of mental disease. Demonstration: Cases of Febrile Delirium, General Paralysis, Catatonia and Idiocy.

2. Review of the general pathology on the ground of the aspect-hypothesis. The terms disease, residual, defective formation, and defective anlage. Clinical and post-mortem pathology and their share in general pathology. Only clinical pathology furnishes data on the psychological and physiological side. Plan of clinical study. Anatomical study. Our knowledge of the macroscopic and microscopic lesions of the nervous system and the underlying pathological processes, defective nutrition, intoxications, abnormal function. Local disorders: Abnormal circulation, local intoxications, traumatic disorders, over-activity, perverted function. Demonstrations of abnormal brains and histological changes.

3. The general plan of the nervous system and illustrations of diseases of various parts (levels). The neural tube; the segmentary arrangement and the elements of the segments within the lowest level. The middle lever apparatus—cerebellum, midbrain and forebrain and their afferent and efferent connections. Demonstrations: 1. Traumatic paralysis of nervous peroneus. 2. Infantile paralysis. 3. Cases of hemiplegia. 4. Lead paralysis (Remak type). 5. Alcohol neuritis. 6. Locomoter ataxia.

4. The principles of localization. The meaning of the connections of neurones by numerous collaterals, of the "interruptions of the tracts by gray matter," of the term "center." Description of the most important "centers," the lesions of the apparatus of mimic movements, the sensorimotor areas, the principal "sensory" projection fields. An outline of the principles of aphasia and its forms, of hemianopsia. Highest level symptoms. Demonstration: Hemiplegia with hemianopsia;

two cases of hemiplegia with motor aphasia; one case of sensory aphasia. Reference to a case of Brown-Sequard paralysis.

5. General outline of mental diseases. Classification given last year; explanation of Kraepelin's classification. Illustration of a paradigm of mental diseases; General paralysis, its etiology, symptomatology and principal types. Demonstration of six cases.

6. Toxic psychoses and psychoses on ground of disturbed metabolism. Summary of the data of psycho-physiological study of fatigue and intoxication furnished by the school of Kraepelin. Review of the methods and the results. Application to the clinical problems. Demonstration: Delirium Tremens, Subacute Alcoholic Insanity. Cretinism. Dementia Precox and Catatonia.

7. Periodical Insanity compared with the types of Verbloedungs-processe. Demonstration of further types of Catatonia and of Periodical Insanity; "Acute Mania," "Acute Melancholia."

8. Short sketch of Senile Dementia and demonstration of a case. Constitutional psychoses. Résumé of the methods and aims of individual psychology (Cattell, Münsterberg, Jastrow, Kraepelin, Gilbert, Binet et Henri, Guicciardi and Ferrari). Value of "types" of character or constitution. Their formation. Dominant ideas. Mysophobia as a type of Neurosis of Fear. Development of Paranoia; cases of Paranoia.

## Anthropology.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be taken up:

A. General, embracing: (a) History, scope and relations of the science of Anthropology. (b) Physical Anthropology. Problems, investigations, results, laboratory work. (c) Ethnography. Races and race-origins. (d) Ethnology, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religions. (e) Linguistics. Race and language. Origin and development of language and of languages. Psychology of language. Gesture-speech and written language. Comparative linguistics. Comparative literature. (f) Criminal

AND PATHOLOGICAL ANTHROPOLOGY. Ethnic morals. (g) HISTORICAL AND ARCHÆOLOGICAL. Primitive man and primitive culture.

B. SPECIAL COURSES embodying the results of the most recent and important studies and investigations in the following among other fields: Anthropometry of Children and Youth; Primitive Children and Children of Civilized Races; Education among Primitive Peoples; the Emotions and their Expressions among the Races of Men; the Child Mind and the Mind of Primitive Man; Myth and Child-Lore; Heredity and Adaptation; the Psychology of the Languages of Primitive Peoples; Sociology and the History of Human Institutions—the Family, the State, the Church; the Origin and Development of Civilization; Anthropological Problems and Results; the Anthropology of the Individual; the Anthropology of Genius; the Evolution Problems of Humanity.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University and every effort will be made to utilize the latest results of Anthropological investigations.

From time to time, the most important current literature will be reviewed and students made acquainted with the best contributions to Anthropological science in the various foreign languages. The importance of a thorough acquaintance with the Bibliography of their subjects is impressed upon all students and all possible assistance in this direction is always at their disposal.

## VI.

## EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of men:

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects:

I. (a) Child Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) Typical Schools and Special Foundations. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

The courses in Education for 1899-1900 will be as follows:

DR. BURNHAM'S COURSES.

A. PEDAGOGICAL APPLICATIONS OF PSYCHOLOGY. Some of the more important chapters in psychology in their educational aspects, such as habit, attention, memory. Such topics as the following will be discussed: The correlation of physical and psychic processes. The psychology of development. Education of the senses. Perception and apperception. Feeling and interest in relation to instruction and training. Suggestion as a factor in education. Education in productive activity. Mental hygiene. Mental diseases and faults of school children. The hygiene of instruction from the standpoint of psychology. Problems in educational psychology. Once a week, half a year. This course may advantageously be taken in connection with Dr. Sanford's course B, on *General Psychology*.

B. THE ORGANIZATION OF SCHOOLS IN EUROPE. The systems of England, France, and Germany. The genesis of the school systems and the wider social and political relations of education. Primary, secondary, and higher education. Educational ideals. Recent movements. Educational literature. One hour a week, half a year.

C. SCHOOL HYGIENE. This course will consist of lectures on special chapters in school hygiene and may be modified as the needs of the students electing the course or other circumstances require. The results of physiological, psychological and anthropological investigations in their bearing upon the hygiene of instruction in the different school subjects. The choice and sequence of studies. The period of study. The hygiene of the pupil at home and in the school. The hygiene of the senses. Somatic hygiene. The hygiene of the nervous system. Methods of studying nervous fatigue in school children. The hygiene of punishment and discipline. One hour a week, half a year.

D. PRESENT PROBLEMS IN EDUCATION. This course will involve the discussion of such topics as the following: Correla-

tion, enrichment of the course of study, elimination. The doctrine of interest. Manual training; physical exercise, gymnastics, play. Medical inspection. Educational ideals and principles. The correlation of educational forces. Teaching as a profession. The training of teachers. Recent movements and present problems. Educational literature. One hour a week, half a year.

E. CONFERENCE, once a week. The work will be determined in part by the needs of the individual students. It is hoped that each student will select, after consultation with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

DR. G. STANLEY HALL'S COURSE.

*Education.* The history of education from savagery and the earliest times to the present. This course will begin with the educational ideas and practices of primitive people, the oriental nations, Greeks, Romans, middle ages and modern times. The chief writers, institutions, and systems will be characterized with especial reference to the application of philosophy and psychology to pedagogy and to the future improvement and idealization of schools and their work from the kindergarten to the university.

One hour weekly, Saturday mornings.

This and Dr. Burnham's Saturday work constitute a teachers' course open to those not members of the University.

The courses as announced above may be modified somewhat as the needs of the students or other circumstances may require.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and

city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*
4. *General Surveys* and Reports on the Present Condition of Education.
5. *Standard Writers* on Education and *Biographies.*
6. *Educational Psychology.*
7. *General Works on the Theory of Education.*
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene.*
10. *The Study of Children, the Kindergarten*, etc.
11. *The State and Laws*, Civic Education, Administration, and School Organization.
12. *Industrial and Technical Education.*
13. *Miscellaneous.*
14. *School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).
15. *Education of Defectives.*
16. *Art Education*, including Museums, etc.
17. *The Training of Teachers;* Examinations, etc.
18. *Moral Education* and School Discipline.
19. *University Education.*
20. *The Learned Professions.*
21. *Special Topics.*
22. *Special Reports of the Bureau of Education.*
23. *Miscellaneous Periodicals.*
24. *Periodicals.*
25. *Miscellaneous Reports;* a, American; b, English; c, French; d, German, etc.
26. *Text-books;* a, Mathematics; b, Science; c, Drawing, etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous; i, History.

27. *Old Text-books*, with same sub-divisions as above.
28. *State and City Reports*, sub-divided by States.
29. *Charts, Maps, Pictures*, etc.
30. *Religious Education.*
31. *Nature Study.*

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society and its valuable historical material are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed, which contains a valuable collection of EDUCATIONAL APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

### SPECIAL STUDENTS IN EDUCATION.

In addition to the members of the University special students are admitted during the year, to the Saturday courses of Drs. Hall and Burnham in Education, for a fee of $25.

# LIBRARY.

The University Library contains about 17,500 bound volumes and 1,500 pamphlets, and the reading-room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

A Works of General Reference.
B Journals.
C Mathematics.
D Physics.
E Chemistry.
F Zoölogy.
G Physiology.
H Pathology.
I Psychology.
J Philosophy.
K Ethics.
L Criminology.
M Anthropology.
N Education.
O Botany.

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of Magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found :

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time; and by the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

## LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading-room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department; and these shall be placed by themselves and marked "reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken ont on Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias, and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

# BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care and that of the authorities of the University, shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty, The Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts

in behalf of the University without authority, the officer or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and co-operation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified, and held for that purpose.

## REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible orders for only the kind and amount of apparatus certain to be used during the year shall be placed ; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year.

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

## PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of the University on October 2nd, 1889.

III. Register and Second Official Announcement, May, 1890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the first statement of the plan, aims, and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University; pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth Official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

XIV. Summer School Programme (July 13 to 25, 1896).

XV. Register and Eighth Official Announcement, April, 1896.

XVI. Summer School Programme (July 19 to 31, 1897).

XVII. Register and Ninth Official Announcement, April, 1897.

XVIII. Summer School Programme (July 13 to 27, 1898).

XIX. Register and Tenth Official Announcement, April, 1898.

XX. Summer School Programme (July 13 to 26, 1899), April, 1899.

## JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

The American Journal of Psychology. This Journal was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford, and E. B. Titchener (Cornell University) with the assistance of an international board of co-operators. Each volume contains four numbers of about 150 pages each. Besides original articles, a considerable portion of its space is devoted to careful digests of the important literature in its field. Price, $5 per volume; single numbers, $1.50. J. H. Orpha, publisher, Worcester, Mass.

The Pedagogical Seminary. This Journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 4, 5 and 6, $5 each. Price of earlier Vols. on application. J. H. Orpha, publisher, Worcester, Mass.

The Mathematical Review. This Journal, of which the first volume is in course of publication, is edited by William E. Story. Its scope includes original research in mathematics, résumés of subjects of a more elementary character, pedagogical and historical sketches and bibliographical notices. Every volume will consist of six numbers of 96 pages each. Each number contains the portrait of some distinguished mathematician. Price, $5 a volume. Published by the editor, Worcester, Mass.

# CLARK UNIVERSITY,

WORCESTER, MASS.

---

# REGISTER

AND

## Twelfth Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
April, 1900.

## CALENDAR: 1900-1901.

| | | |
|---|---|---|
| 1900. | | |
| April 2. | Monday A. M. | Spring Recess. |
| – 7. | Saturday P. M. | |
| June 14. | Thursday P. M. | Eleventh academic year closes. |
| Sep. 27. | Thursday A. M. | Twelfth academic year begins. |
| Dec. 22. | Saturday A. M. | Christmas Recess. |
| 1901. | | |
| Jan. 1. | Wednesday P. M. | |
| April 1. | Monday A. M. | Spring Recess. |
| – 6. | Saturday P. M. | |
| June 13. | Thursday P. M. | Twelfth academic year closes. |

# MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880-81; Professor of Psychology, Johns Hopkins University, 1881-88; LL. D. University of Michigan, 1888, and Williams College 1889; Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874-75; Tutor of Mathematics, Harvard University, 1875-76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888-89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889-91; Instructor in Biology, University of Wisconsin, 1891-92.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Assistant Professor of Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology, Johns Hopkins University, 1888.

HENRY TABER, PH. D., 65 West St.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888; and Assistant in Mathematics, Johns Hopkins University, 1888-89; Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Assistant Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885-86; Parker Fellow, 1886-89; Student, Universities of Berlin, Paris, Stockholm, 1886-90; Ph. D., Berlin, 1890; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Instructor in Pedagogy.

A. B., Harvard University, 1882; Instructor in Wittenberg College, 1882-83; Instructor in the State Normal School, Potsdam, N. Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89.

ALEXANDER F. CHAMBERLAIN, PH. D., 12 Shirley St.
Lecturer in Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto, 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in German in University College, and the University of Toronto, 1888-92; Examiner in Modern Languages in the University of Trinity College, Toronto, 1890-91; Examiner in French and German, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92; Ph. D., *ibid.*, 1892; and Lecturer in Anthropology, 1892; Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Associate Editor *American Antiquanan.*

JOSEPH DE PEROTT, 5 Gates St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., California, Pa.
Docent in Pedagogy.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95; Lecturer in Education, Bryn Mawr College, 1896-97; Visited European Institutions, 1897-98; Professor of Psychology and Pedagogy, State Normal School, California, Pa., since 1898.

ADOLF MEYER, M. D., 81 Chatham St.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91; Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95. Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

FRANK K. BAILEY, B. S., Leadville, Col., 9½ Hancock St.
Fellow in Physics.

B. S., Colorado College, 1898; Scholar, Clark University, 1898-99.

HENRY ROLFE BAKER, M. A., B. D., Fairfax, Ia.
Honorary Fellow in Psychology. 41 Maywood St.

A. B., Iowa College, 1882, A. M., 1885; B. D., Yale University, 1886; Congregational Ministry, 1887; Graduate Student, Andover Theological Sem-

inary, 1889-90; Graduate Student in Philosophy and Comparative Religion, Harvard Divinity School, 1890-91; Student in Psychology, Clark University, 1894-95; Fellow, 1895-97; Hon. Fellow, 1897-99.

ELMER B. BRYAN, A. B., Bloomington, Ind., Fellow in Philosophy. 52 Hollywood St.

Graduate of Ind. State Normal, 1889; A. B., Indiana University, 1893; Principal of High School, Kokomo, Ind., 1893-94; Teacher of History, Industrial Training School, Indianapolis, 1894-96; Professor of Pedagogy Butler College, 1896-97; Assistant Professor of Pedagogy, Indiana University, 1897-98 Associate Professor since 1898; Graduate Student in Philosophy, Harvard University, Oct. 1898 to Jan. 1899; Scholar, Clark University, Jan. to June, 1899.

T. R. CROSWELL, PH. D., Farmington Falls, Me., 5 Gates St. Honorary Fellow in Pedagogy.

A. B., Bowdoin College, 1891; Principal, Wilton Academy, 1891-94; Student in Pedagogy, Columbia College, 1894-95; Scholar in Pedagogy, Clark University, 1895-97; Teacher in Public Schools of Chicago, 1897-98; Teacher in Stevens Point (Wis.) Normal School, 1899; Ph. D., Clark University, 1899.

D. ELLIS DOUTY, B. S., Seattle, Washington, 9 Wyman St. Fellow in Physics.

B. S., University of Washington, 1892; Assistant in Physics, Laboratory University of Washington, 1895-96; Tutor in Physics, 1896-98; Scholar, Clark University, 1898-99.

FREDERICK EBY, A. B., Berlin, Ontario, 9 Wyman St. Fellow in Psychology.

A. B., McMaster University, 1895; Graduate Student, University of Chicago, 1895-97; Assistant Instructor, Morgan Park Academy, Morgan Park, Ill., 1897-98; Scholar, Clark University, 1898-99.

CLEMENS JAMES FRANCE, A. B., Johnstown, N. Y., Fellow in Psychology. 70 Florence St.

A. B., Hamilton College, 1898; Scholar, Clark University, 1898-99.

CLARK WILSON HETHERINGTON, A. B., San Diego, Cal., Fellow and Assistant in Psychology. 70 Florence St.

A. B., Leland Stanford, Jr., University, 1895; Instructor, Encina Gymnasium, Stanford University, 1893-96; Statistician and Director of Physical Training, Whittier State School, 1896-98; Fellow, Clark University, 1898-99.

JAMES EDMUND IVES, Philadelphia, Pa., 12 Tirrell St. Fellow in Physics.

Assistant Curator, Academy of Natural Sciences, Pa., 1887-93; Instructor in Physics, Drexel Institute, Pa., 1893-97; Jessup Student, Academy of Natural Sciences, Pa., 1887-91; Student in Histology, and Embryology, University of Pennsylvania, 1888-89; Student in Mathematics, 1893-95; Student in Physics, Harvard University, summer of 1894; Student in Physics, Cavendish Laboratory, Cambridge, England, 1896; Scholar, Clark University, 1897-98; Fellow, 1898-99.

MAX MEYER, PH. D., 75 Florence St. Honorary Fellow in Psychology.

Ph. D., University of Berlin, 1896; Graduate Student, Berlin, 1896-98.

HALCOTT C. MORENO, A. M., Gainesville, Ga.,
Fellow in Mathematics. 70 Florence St.

A. B., University of Georgia, 1893; A. M., 1894; B. L., 1896; Tutor in Mathematics, 1893-97; Scholar, Clark University, 1897-98; Fellow, 1898-99.

GEORGE E. PARTRIDGE, Worcester, Mass.,
Honorary Fellow in Psychology. 54 Hollywood St.

Special Student in Philosophy, Clark University, 1895-96; Scholar, 1896-98; Fellow, 1898-99.

CHARLES H. SEARS, PH. D., West Brewster, Mass.,
15 Woodland St.
Honorary Fellow in Psychology and Pedagogy.

Graduate Four Years' Course, State Normal School, Westfield, Mass., 1883; A. M., Alleghany College, 1893, and Ph. D., 1895; Principal of Public Schools, Cheshire, Mass., 1883-85; Teacher, Prospect Park Institute, Brooklyn, N. Y., 1885-88; Teacher of Latin, State Normal School, Edinboro, Pa., 1888-92; Principal, Normal Department, Claflin University, 1892-97; Hon. Fellow, Clark University, 1897-99.

HENRY DAVIDSON SHELDON, A. M., Santa Clara, Cal.,
Fellow, and Assistant in Pedagogy. 4 Hammond St.

A. B., Stanford University, 1896; A. M., 1897; Instructor in Department of Education, Stanford University, 1896-97; Fellow, Clark University, 1897-98; Lecturer in Summer School, 1898 and 1899; Fellow and Assistant in Pedagogy, 1898-99.

STEPHEN ELMER SLOCUM, B. E., Schenectady, N. Y.,
Fellow in Mathematics. 10 Barbour St.

B. E., Union University, 1897 (with honors in Mathematics and Physics); Scholar, Clark University, 1897-98; Fellow, 1898-99.

WILLARD STANTON SMALL, A. M., 5 Hollywood St.
Fellow in Psychology.

A. B., Tufts College, 1894; Tufts Divinity School, 1894-96; Professor of English Language and Literature, Lombard University, 1896-97; A. M., Tufts College, 1897; Scholar, Clark University, 1897-98; Fellow, 1898-99.

FRANK C. SPENCER, PH. D., Monte Vista, Colo.,
Honorary Fellow in Pedagogy. 4 Benefit Terrace.

C. E., Ohio Normal University, 1889; Graduate, Colorado State Normal School, 1891; B. Sc., University of Colorado, 1894; Supt. of Schools, Monte Vista Colo., 1894-97; Graduate Student and Instructor in Mathematics, University of Colorado, 1897-98; Ph. D., Teachers' College, Columbia University, 1899.

ORLANDO S. STETSON, Franklin, Mass., 70 Florence St.
Fellow in Mathematics.

Worcester Polytechnic Institute, 1896-98; Scholar, Clark University, 1898-99.

CHARLES HERBERT THURBER, Chicago, Ill.
Honorary Fellow in Pedagogy. 6 William St.

Ph. B., Cornell University, 1886; A. M., Haverford College, 1890; Registrar and Secretary, Cornell University, 1886-88; Teacher, Haverford Col-

lege Grammar School, 1889-90; Special Agent U. S. Bureau of Education in Germany, 1890-91; Student, Royal Polytechnicum, Dresden, 1890-91; Instructor in French, Cornell University, 1891-93; Professor of Pedagogy, Colgate University, and Principal Colgate Academy, 1893-95; Director of Division of Child Study, Department of Public Instruction, N. Y. State, 1895-96; Assistant to Editor-in-Chief, Johnson's Universal Cyclopædia, 1892-94; Editor of the School Review and Illinois Transactions; Associate Professor of Pedagogy, and Dean of the Morgan Park Academy, University of Chicago, since 1896; Honorary Fellow, Clark University, Jan. to Mar., 1899.

NORMAN TRIPLETT, A. M., Perry, Ill., 7 Gates St.
Fellow and Assistant in Psychology.

A. B., Illinois College, 1889; Principal, New Berlin (Ills.) School, 1889-91; Practiced Law, 1891-94; Instructor in Physics, Chemistry and Psychology, Quincy (Ills.) High School, 1894-97; A. M., Indiana University, 1898; Fellow, Clark University, 1898-99.

JOHN N. VAN DER VRIES, A. M., Grand Rapids, Mich.,
Fellow in Mathematics. 22 May St.

A. B., Hope College, 1896; A. M., 1899; Principal of School, East Saugatuck, Mich., 1896-97; Scholar, Clark University, 1897-98; Fellow, 1898-99.

FRANK B. WILLIAMS, M. S., Warrensburg, Mo.,
Fellow in Mathematics. 70 Florence St.

C. E., Missouri State University, 1890; Teaching Fellow in Mathematics, Missouri State University, 1892-93; M. S., Missouri State University, 1893; U. S. Asst. Engineer, Tennessee River Improvement, 1895-97; Scholar, Clark University, 1897-98; Fellow, 1898-99.

ALBERT M. BLAISDELL, B. S., Bradford, N. H.,
Scholar in Mathematics. 75 Florence St.

B. S., Brown University, 1899.

C. EDWARD FISHER, A. B., 8 Wyman St.
Scholar in Mathematics.

A. B., St. Lawrence University, 1898; Drill Master, "House of Reformation," Boston, Mass., Feb. to July, 1899. Scholar in Mathematics, Clark University, Oct., 1899, to Feb., 1900.

S. B. HASLETT, A. B., 4 Crown St.
Scholar in Philosophy.

Graduate of the Edinboro (Pa.) State Normal School, 1885; Principal of Creighton (Pa.) Public Schools, 1887-88; A. B., Grove City College, Pa., 1889; Principal Braddock High School, 1890-91; Graduate Allegheny Theological Seminary, 1892; A. M., Grove City College, 1896; Presbyterian Ministry, 1892-98. Scholar, Clark University, 1898-99.

A. S. HURST, B. A., Morpeth, Ontario. 9 Wyman St.
Scholar in Psychology.

Teacher, Ontario Public Schools, 1887-89; 1893-95; B. A. (with first-class honors in Psychology and Philosophy), University of Toronto, 1899.

EDWARD M. MONTCHYK, B. S., Denver, Colo. 12 Tirrel St.
Scholar in Physics.

B. S., University of Colorado, 1899; Scholar in Physics, Clark University, Oct., 1899; Whiting Fellow, Harvard Univ., Nov., 1899.

FREDERICK H. SAUNDERS, Worcester, Mass.,
Scholar in Pedagogy. 18 Gates St.

Graduate, State Normal School, Prov., R. I., 1883; Principal of Grammar Schools, Westerly, R. I., 1884-87; Braintree, Mass., 1887-91; River Point, R. I., 1892-95; Bristol, R. I., 1896-98. Scholar in Pedagogy, Clark University, Jan., 1900.

AUGUST W. TRETTIEN, B. L., Madison, Wis.,
Scholar in Pedagogy. 12 Tirrell St.

Graduate, State Normal School Oshkosh, Wis., 1894; Principal, Public Schools, Appleton, Wis., 1894-97; B. L., University of Wisconsin, 1899; Graduate work, University of Wisconsin, 1898-99; Institute Instructor in Wisconsin and South Dakota.

---

## SPECIAL STUDENTS.

JOHN M. BEMIS, M. D., Salisbury St.
Special Student in Biology.

RAYMOND H. COOK.
Special Student in Pedagogy, Oct., 1899, to Feb., 1900.

GEORGE F. COLE, A. M.
Instructor in Modern Languages, English High School, Worcester, Mass., Special Student in Philosophy and Pedagogy.

STEPHEN S. COLVIN, PH. D.
Instructor in English, English High School, Worcester, Mass., Special Student in Philosophy and Pedagogy.

ELIZABETH C. HARRINGTON.
Teacher, Holden, Mass., Special Student in Pedagogy, Oct., 1899, to Feb., 1900.

---

LOUIS N. WILSON,
Librarian and Clerk of the University. 11 Shirley St.

# ADMINISTRATION.

The trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively through the three committees named below, and also through the President of the University.

## BOARD OF TRUSTEES.

JONAS G. CLARK,

STEPHEN SALISBURY, JOHN D. WASHBURN,
GEORGE F. HOAR, FRANK P. GOULDING,
WILLIAM W. RICE,* GEORGE SWAN,
EDWARD COWLES, THOMAS H. GAGE.

## OFFICERS.

| | |
|---|---|
| President, - - - | JONAS G. CLARK, |
| Vice-Presidents, - - | GEORGE F. HOAR, WILLIAM W. RICE,* |
| Treasurer, - - - | THOMAS H. GAGE, |
| Secretary, - - - | FRANK P. GOULDING. |

## COMMITTEES.

*Finance.*

JONAS G. CLARK, STEPHEN SALISBURY,
JOHN D. WASHBURN, THOMAS H. GAGE.

*Buildings.*

JONAS G. CLARK, STEPHEN SALISBURY.

*By-Laws.*

JONAS G. CLARK,

WILLIAM W. RICE,* STEPHEN SALISBURY,
JOHN D. WASHBURN, GEORGE SWAN.

*Died March 1st, 1896.

### PRESIDENT.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent, or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the corporation Sept. 26, 1889.

## FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

### I. UNIVERSITY SENATE.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

### II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

### III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangement, cataloguing and use of books and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

# GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:

I. Mathematics.
II. Physics.
III. Chemistry.
IV. Biology.
V. Psychology.

In addition to these *Education* is now a sub-department of Psychology.

## Admission.

Graduate students only are admitted, or those of equivalent attainments, except in rare and special cases. At present no entrance examinations are required; but by testimonials, diplomas, personal interviews, or written specimens of work, the authorities must be satisfied that the applicant has scholarship enough to work to advantage, and zeal and ability enough to devote himself to his chosen field. The methods of the University are too costly, and its energy and funds too pre-

cious, to be spent upon men who are not well trained, promising and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges, and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief as well as the best work of this University is individual, and involves daily suggestion, encouragement and direction.

### Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits his power in teaching.

### I. Docents.

The highest annual appointment is that of Do-

cent. These positions are primarily honors, and are reserved for a few men whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their department, their time will be mainly reserved for study and research in a way best adapted to qualify them still more fully for academic advancement.

These positions are now official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can now be furnished on application and which requires a memoir or essay representing original work in their own department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability, and so far as this diploma can have the significance of a title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that by the existence of such a

select body of men of guaranteed scientific training, ability and approved power to teach, the difficulties under which college trustees sometimes succumb in selecting suitable men as their professors may be diminished, and that otherwise this new grade will aid in raising standards of academic scholarships in colleges and in encouraging scientific research here. Good men of this class may be paid a salary.

## II. Candidates for the Degree of Doctor of Philosophy.

In most cases three, or at least two, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time during the academic year when, in the judgment of the University authorities, the candidate is prepared. A prearranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a dissertation upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be reported on in writing by the chief instructor before the examination, printed at the expense of the candidate, and at least one hundred copies

given to the University. In case, however, of dissertations of very unusual length, or containing very expensive plates, the Faculty shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty.

Such formal or informal tests as the Faculty shall determine, shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede by at least one academic year the examination itself. (See special rules below.)

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the dissertation must be in the hands of the Librarian before the diploma is given. In exceptional cases, however, and by special action of the Faculty, the ceremony of promotion may precede the presentation of the printed copies of the dissertation. The latter, however, must always precede the actual presentation of the diploma.

An oral but not a written examination is required upon at least one minor subject in addition to the major, before an examination jury composed of at least four members, including the head of

the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examination to the Faculty, which, if it is also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard of requirements for it be kept the highest practicable, that it be reserved for men of superior ability and attainment only, and that its value here be never suffered to depreciate.

It is to the needs of these students that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are primarily intended, although any of these honors may be awarded to others.

## Special Rules Concerning the Doctor's Degree.

I. *Residence.* No candidate shall receive the degree of Doctor of Philosophy without at least one year's previous residence.

II. *Candidature for the Doctor's Degree.* Every applicant for the doctor's degree shall fill out before October fifteenth the regular application blank provided at the office. This schedule shall be submitted to the head of the department and the instructor in the major subject. Before affixing their signatures they shall satisfy themselves, in such manner as they may desire, as to the fitness of the applicant.

III. When countersigned, this schedule shall be filed with the President, who will appoint an examiner to serve with a representative of the major subject as a committee to determine the proficiency of the applicant in French and German.

IV. In case of a favorable report by this committee the applicant shall be a regular candidate for the degree.

V. Candidates complying with all preliminary conditions, including the examinations in French and German, before November first, will be allowed to proceed to the doctor's examination at any time between May fifteenth following and the end of the academic year.

VI. Dissertations must be presented to the instructor under whose direction the dissertation is written, and reported upon by him before the

doctor's examination. In every case the dissertation shall be laid before the jury of examination, at the time of examination, in form suitable for publication. This provision shall not, however, preclude the making of such minor changes later as the chief instructor may approve.

VII. The dissertation shall be printed at the expense of the candidate and the required copies deposited with the Librarian within one calendar year after the first of October following the examination. The candidate alone will be held responsible for the fulfilment of these conditions.

VIII. The favorable report of the chief instructor, filed in writing with the Clerk of the University, shall be a sufficient imprimatur or authorization for printing as a dissertation. The printed copies shall bear upon the cover the statement of approval in the following words, over the name of the chief instructor:

A Dissertation submitted to the Faculty of Clark University, Worcester, Mass., in partial fulfilment of the requirements for the degree of Doctor of Philosophy, and accepted on the recommendation of (Name of the chief instructor).

IX. *Examinations for the Doctor's Degree.* The examinations for the doctor's degree may be held at any time during the academic year,

provided that at least one academic year has elapsed since the completion of the preliminaries of candidature, except in the case of fulfilment of these conditions between the beginning of any academic year and November first of that year, to which case Rule V applies. The examinations shall be held at such hours and places as the President may appoint.

X. Examinations may also be held during the regular vacations of the University, but for these an additional fee of five dollars to each examiner, and the reasonable travelling expenses of any examiners who are out of town, all payable in advance, will be required.

XI. All these special rules shall go into force immediately as far as practicable, and shall govern all applicants for degrees in the academic year 1900-1901.

## III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the University, may also be received. This class includes persons who may desire to devote themselves exclusively to one or more of the special

branches—mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to matriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

### IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes, who are nearly, if not quite qualified to become candidates for the degree of Doctor of Philosophy, may also be received.

Students of this class must for the present have completed the work of the first three years of a regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their

attainments, and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

### Fellowships and Scholarships.

Until three years ago the sum of $4,800 was devoted to Fellowships. The plan then was to provide in this way for eight Senior Fellows at $400 each, and eight Junior Fellows at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 was remitted, thus making the value of these Fellowships $600 and $400 each, respectively.

Besides these, sixteen other appointments were made, viz.: eight Senior University Scholarships, remitting all the fee, and eight Junior University Scholarships, remitting one-half the fee.

While the University desires to continue this plan, it was able last year only to approximate it as far as the reduced funds available for this purpose permitted. For next year the same conditions seem likely to prevail. The significance of Junior and Senior Fellowships and Scholarships will therefore, remain unchanged, but the income of the appointments must be diminished.

## A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

## The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

The following regulations apply to the award of the income of the Field Fund:

1. Regard is had to the intellectual ability of the candidate as well as to his need of pecuniary assistance.

2. Only candidates who have spent three months at the University are considered.

3. The head of each department will consider and report to the Faculty desirable cases in his department.

4. Applications are received not later than December 15th, and the awards made as soon as possible after the Christmas recess.

## Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three learned professions, although the latter are not excluded.

Applications should state the candidate's course of study, and be accompanied by testimonials or diplomas; should indicate a decided preference for some special department, and, if possible, be accompanied, for the aid of the Board of Selection, by some specimen of work. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during the year. The names of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the entire academic year and devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must co-operate in promoting harmony, order, and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Being intended primarily as honors, both Fellowships and Scholarships are awarded without reference to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

## METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each instructor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus and reference to standard text-books, and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will from time to time be given.

SEMINARIES. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded, and the efficiency of universities has been greatly increased.

LABORATORY WORK. For beginners this has been from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators are tested, methods discussed and perfected, with a view to developing that independence in

research which is the consummation of scientific culture.

## NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $200 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will be given information, so far as possible, upon any of these or other points, in advance of official announcement, upon addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendance to its close.

The Graduate Club invites all members of the University to become members and to take part in its proceedings.

The following are the statements and announcements of the departments for the academic year, 1900-1901.

# I.

# MATHEMATICS.

## Programme for 1900–1901.

### INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is given by means of introductory, advanced, and special courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

*Group* A:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Theory of Functions of Real and Imaginary Variables, and Definite Integrals; 3 hours a week, through the year.

Theory of Numbers; 2 hours a week, one half-year.

Modern Synthetic Geometry; 2 hours a week, one half-year.

*Group* B:

Analytic Geometry of Conic Sections, Quadric Surfaces, and Higher Plane Curves; 3 hours a week, through the year.

Elliptic Functions, Differential Equations, and Calculus of Variations; 3 hours a week, through the year.

Algebraic Substitutions and their Application to the Theory of Equations; 2 hours a week, one half-year.

Analytic Geometry of Higher Surfaces and Twisted Curves; 2 hours a week, one half-year.

Algebraic Invariants; 2 hours a week, one half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the present day. Thus, for example, the conic sections and quadric surfaces are treated by modern methods from the beginning, with adequate consideration of the discoveries of the

great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

*Special advanced courses*, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the Degree of Doctor of Philosophy.

---

For the academic year 1900–01, the following courses are offered:

BY PROFESSOR STORY.

Advanced courses:

RESTRICTED SYSTEMS OF EQUATIONS; 2 hours a week, second half-year.

DIFFERENTIAL GEOMETRY; 3 hours a week, first half-year.

SPECIAL TOPICS IN ANALYTIC GEOMETRY; 3 hours a week, second half-year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory course:

MODERN SYNTHETIC GEOMETRY; 2 hours a week, first half-year.

BY ASSISTANT PROFESSOR TABER.

Advanced course:

FINITE CONTINUOUS GROUPS; 2 hours a week, one half-year.

Introductory courses:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

THEORY OF FUNCTIONS OF REAL AND IMAGINARY VARIABLES, AND DEFINITE INTEGRALS; 3 hours a week, through the year.

SEMINARY; through the year.

BY ASSISTANT PROFESSOR WEBSTER.

[See announcement of Department of Physics, courses 8, 9, 10.]

BY M. DE PEROTT.

Advanced course:

RIEMANN'S SURFACES AND ABELIAN INTEGRALS; 2 hours a week, second half-year.

Introductory course:

THEORY OF NUMBERS; 2 hours a week, first half-year.

---

During the academic years 1889-1900, advanced and special courses have been given in:

1. THE HISTORY OF ARITHMETIC AND ALGEBRA among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.
3. LINEAR TRANSFORMATIONS AND ALGEBRAIC INVARIANTS, with applications to algebraic equations and geometry.
4. THEORY OF SUBSTITUTIONS, with applications to algebraic equations.
5. PLANE ANALYTIC GEOMETRY.
6. SOLID ANALYTIC GEOMETRY.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass's Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general theory of linear differential equations, Gauss's, Legendre's, and Bessel's functions.

30. Partial Differential Equations, including Laplace's, Bessel's, and Lamé's functions.

31. Finite Differences and Probabilities.

32. Applications of the Infinitesimal Calculus to the Theory of Surfaces.

33. Simultaneous Equations, including Restricted Systems.

34. Theory of Transformation Groups.

35. The Application of Transformation Groups to Differential Equations.

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible, to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several instructors, and those who have attained the necessary proficiency are personally directed in individual researches,

of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented approved memoirs embodying the results of original investigation, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University.[1] Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

## MATERIAL FACILITIES.

The library is provided with the more important textbooks, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any considerable extent to mathematics. Among the periodicals of which the library has complete or nearly complete sets are the following:

Abhandlungen der Math.-Phys. Classe der Königl. Sächs-

[1] For requirements see p. 42.

ischen Gesellschaft der Wissenschaften. Leipzig, 1852 to date. Complete.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences. Paris, 1835 to date. Complete.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892 to date.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenschaften zu Göttingen. 1853-88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798 to date. Complete.

Transactions of the Philosophical Society of Cambridge. 1822 to date. Complete.

Philosophical Transactions of the Royal Society. London, 1665 to date. Complete.

Proceedings of the Cambridge Philosophical Society. 1843 to date. Complete.

Proceedings of the Royal Society of London. 1800 to date. Complete.

Acta Mathematica. Stockholm, Berlin and Paris, 1882 to date. Complete.

American Journal of Mathematics. Baltimore, 1878 to date. Complete.

Annales scientifiques de l'Ecole Normale Supérieure. Paris, 1864 to date. Complete.

Bulletin des Sciences Mathématiques (Darboux, etc.). Paris, 1870 to date. Complete.

Bulletin de la Société Mathématique de France. Paris, 1873 to date. Complete.

Jahrbuch über die Fortschritte der Mathematik. Berlin, 1868 to date. Complete.

Journal de l'Ecole Polytechnique, etc. Paris, 1794 to date. Complete.

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Paris, 1836 to date. Complete.

Journal für reine und angewandte Mathematik (Crelle, etc.). Berlin, 1826 to date. Complete.

Mathematische Annalen (Clebsch, etc.). Leipzig, 1869 to date. Complete.

Messenger of Mathematics, Oxford, Cambridge, and Dublin, 1862 to date. Complete.

Nouvelles Annales de Mathématiques. Paris, 1842 to date. Complete.

Proceedings of the London Mathematical Society. London, 1865 to date. Complete.

Quarterly Journal of Mathematics, pure and applied. London, 1857 to date. Complete.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Leipzig. Vols. 34-42, 1888-98. Complete from Vol. 34 (1888) to date.

Revue semestrielle des Publications Mathématiques. Amsterdam, 1893 to date. Complete.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread models of developable surfaces.

The department possesses also:

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

# II.

## PHYSICS.

ASSISTANT PROFESSOR WEBSTER will regularly deliver, with a period of two years, the following cycle of unstarred courses. The starred courses have been given, or will be given at irregular intervals.

1. DYNAMICS. GENERAL PRINCIPLES, CANONICAL EQUATIONS, METHODS OF HAMILTON AND JACOBI, SYSTEMS OF PARTICLES, RIGID BODIES.

2. NEWTONIAN AND LOGARITHMIC POTENTIAL FUNCTIONS, ATTRACTION OF ELLIPSOIDS.

3. ELASTICITY, HYDRODYNAMICS, WAVE AND VORTEX MOTION, DYNAMICAL BASIS OF SOUND AND LIGHT.

3 a.* DYNAMICS OF CYCLIC AND OSCILLATORY SYSTEMS, with APPLICATIONS TO THEORY OF ELECTRICITY, SOUND AND LIGHT.

4. ELECTRICITY AND MAGNETISM.

5. OPTICS, PHYSICAL AND GEOMETRICAL. ELASTIC AND ELECTROMAGNETIC WAVE-THEORIES.

5 a.* COMPARISON OF THE THEORIES OF THE ETHER.

6. THERMODYNAMICS, THERMO- AND ELECTRO-CHEMISTRY, KINETIC THEORY OF GASES, RADIATION.

7. THE PARTIAL DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS.

Laplace's Equation, Equation of Thermal and Electrical conduction, Equation of Wave-motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's, Bessel's, and Lamé's Functions.

8*. LINEAR DIFFERENTIAL EQUATIONS.

9.* ELLIPTIC FUNCTIONS, with certain physical applications.

10.* ORTHOGONAL SURFACES AND CURVILINEAR CO-ORDINATES, and their applications.

The courses for the year 1900-1, will be 1, 2, 3, 4. (5, 5 a, 6 and 7 have been given this year).

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there is held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals.

A part of the work of the colloquium consists in the systematic presentation of certain classical researches, connected more or less with the lectures, in preparing which the students make use of the original sources of information, thus gaining much experience in methods of research. The work of the colloquium has an excellent effect in training students to present their ideas in a systematic manner before an auditory.

In addition to the lectures announced above, advanced courses may occasionally be given on subjects not included in the list of starred courses.

The aim of the department is to insure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put at work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has

been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will have at all times the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat or electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the

geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, so far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivatives, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation may be recommended to the student Greenhill's, Williamson's, Byerly's, or Lamb's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus's Determinants.

It cannot be too strongly urged that the student should, from the beginning, be able to read with ease and to make use of works in French and German.

## Requirements for the Doctor's Degree.

1. The ability to read at sight specimens of scientific French and German, tested before the first of November preceding the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics,[1] and upon the subjects named above in the regular course in Theoretical Physics, as a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfilment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment in science to encourage research in new fields by immature and ill-prepared minds and hands.

---

[1] Every student is recommended to provide himself with Winkelmann's *Handbuch der Physik* as a work for continual reference.

The following statement is here inserted for the benefit of students of mathematics:

The requirements for the minor in Mathematical Physics may be fulfilled in any one of the following three ways:

1°. By attending the lectures in course 1, as far as Rigid Bodies (about thirty-five lectures at the beginning of course), and courses 2 and 3 (about seventy lectures).

2°. By reading the introduction, Part I, and sections 158–161 of Dr. Webster's *Lectures on Electricity and Magnetism*, and by attending the lectures in course 3.

3°. By reading P. G. Tait's *Dynamics*, together with Chapter 4 of the above.

## Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall, the storage battery and dynamo switch-board, Dr. Webster's drop chronograph,[1] the standard condenser and other apparatus used in determining "v," and a large electromagnet, used for researches in magnetism and diamagnetism.[2]

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it were placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires,[3] with the motor and blower used in driving it. On a second pier is a Rayleigh current-weigher for absolute determinations.[4] The room also contains a new apparatus for the measurement of the intensity of sound in free air,[5] so sensitive that it

[1] vid. Webster, Physical Review, Vol. VI, 5, 1898.
[2] vid. Wills, Physical Review, April, 1897.
[3] vid. Saunders, Physical Review, Vol. IV, 20, 1896.
[4] vid. Taylor, Physical Review, Vol, VII, 31, 1898.
[5] vid. Webster and Sharpe, A. A. A. S. Report, 1898.

cannot, in the daytime, be used in any other room in the building. It is also fitted up as a photographic dark room. In room B are two piers standing in front of the windows, and designed for spectroscopic work. On one of them stands a high speed motor-chronograph [1] and on the other formerly stood the absolute electrometer,[2] and at present are a Michelson interferometer, and a sensitive radiometer for radiation measurements. The room C contains the astronomical clock and balances, and is now used for electrical measurements. The room E is fitted up as a general workshop, and contains a lathe, planer, jeweller's lathe for lapidary work, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery.

The farther end is used as a carpenter shop for pattern-making, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at present used for optical work. The next room is the professor's office and also contains cases for the apparatus when not in use, together with a store-room at one end. On the walls is a large collection of blue-prints of mathematical diagrams, the originals of the figures in Dr. Webster's "Electricity and Magnetism." Here are also a number of interesting models used in the teaching of dynamics, thermo-dynamics, electricity, etc., the number of which is continually increasing, and some of which are rarely to be found. Among them are Maxwell's Dynamical Top and several other interesting tops, Rayleigh's Induction model, Gibbs's and other thermodynamical surfaces. The third room is the lecture-room, and is adorned with Rowland's great spectrum map. All the rooms are wired with several sets of wires from the switch-board, so that direct current of various voltages, and alternating current, may be had at any time.

Special mention should be made of the work-shop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied

[1] vid. Webster, Am. Jour. Sci., Vol. III, 1897.
[2] vid. Edmondson, Physical Review, Feb., 1897.

from a ten-horse power Armington & Sims engine with independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. Many of the principal pieces of apparatus belonging to this department have been here constructed. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided.

## The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M., and any number of books may be taken out by any person, and kept ten days. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though not imposing as regards size, is carefully selected, and while the number of volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may fairly be said to contain the best works. Among others may perhaps be mentioned:

*Collected Writings* of Helmholtz, Kirchhoff, Thomson, Green, McCullagh, Joule, Stokes, Maxwell, Rayleigh, Gauss, Fourier, Laplace, Cauchy.

*Potential, Electricity and Magnetism.* Riemann, Betti, Dirichlet, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Boltzman, Mascart and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

*Elasticity.* Mathieu, Ibbetson, Love, Todhunter and Pearson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

*Hydrodynamics.* Bassett, Lamb, Kirchhoff, Neumann, Poincaré.

*Light.* Mascart, Kirchhoff, Helmholtz, Neumann, Volkmann, Résal, Poincaré, Bassett, Preston.

*Heat.* Clausius, Kirchhoff, Rühlmann, Boltzman, Bertrand, Zeuner, Poincaré, Preston.

*Sound.* Rayleigh, Donkin.

A large number of treatises on Mechanics, and a set of the Travaux et Mémoires du Comité International de Poids et Mesures, may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.
Proceedings Royal Society.
Philosophical Magazine.
Physical Review.
Nature.

The library subscribes to the following journals :

American Journal of Science.
Philosophical Magazine.
Philosophical Transactions.
Proceedings Royal Society.
Physical Review.
Journal of Physical Chemistry.
Electrician.
Electrical World.
Nature.
Science.
Annalen der Physik u. Chemie.
Beiblätter zu den Annalen der Phys. u. Chemie.
Zeitschrift für Instrumentenkunde.
Verhandlungen der Deutschen Physikalischen Gesellschaft.
Journal de Physique.
Comptes Rendus.

## III.

### CHEMISTRY.

No courses will be offered in this department during the year 1900-1901.

# IV.

## BIOLOGY.

### Programme of Work for Year 1900–1901.

Dr. Hodge will offer the following courses:

I. General Biology. This course is intended to give in general outline the fundamental principles of biological science. A general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organism. The topics: *Methods and aims of biological research, origin of living matter, organization, growth and reproduction, heredity, differentiation* and *evolution* will be given special prominence throughout the course. It is further proposed to combine with this a discussion of the *principles of elementary biological instruction* together with outlines of a course in nature study for the public schools. One lecture weekly, October to June. Laboratory work will be arranged to suit the requirements of those taking the course.

II. Comparative Study of Nervous Systems and Sense Organs. The point of view of this course will be both anatomical and physiological. It is intended to begin with a study, as far as possible comparative, of the structural elements of the nervous system in both invertebrates and vertebrates. Following this, it is proposed to consider the structure and functions of the nervous system in a series of animals, beginning with the cœlenterata and ascending through the molusca, vermes, tunicata, arthropoda and vertebrates. The course will be illustrated, so far as possible, by diagrams, models, dissections and experiments.

In future each of the above courses will be given in extenso during alternate years, course I being given in 1900-1901. Course II will be abbreviated to about six lectures during January and February.

A biological seminary will meet one evening weekly throughout the year.

## PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations and laboratory work in the following lines:

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divisions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1900–1901 will be offered as follows:

III. PHYSIOLOGY, ANATOMY AND HISTOLOGY OF THE HUMAN NERVOUS SYSTEM. One hour a week, throughout the year.

IV. PHYSIOLOGY OF NUTRITION.

V. PHYSIOLOGY OF REPRODUCTION.

By way of supplementing the above and courses in other departments of the University, three special courses have been planned as follows:

VI. EMBRYOLOGY AND GROWTH OF THE HUMAN BRAIN AND

Sense Organs. Six lectures, with demonstrations and literature.

VII. Practical Histology of the Nervous System. The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. It will be arranged practically to meet the needs of individual students. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

VIII. For those who do not take work in the laboratory, but desire to see the actual specimens and experiments, a course of demonstrations to run somewhat parallel with the above courses will be offered. One hour weekly, through the year.

## Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research,

the resources of the department are such that he will be given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and State universities, is sufficient to enable students to begin work here.

It is proposed during the year to focus attention somewhat upon the study of animal activity, normal rhythms of rest and work in a series of animals as related to structure and physiological condition of the nervous system. Incidentally this will include the gathering of data as to functions and work of animal species.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own microscopical glass, slides and covers, and must pay the cost price of all glassware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahresberichte and Centralblätter greatly facilitates the work of referring to

the literature of topics under investigation in the laboratory.

THE JOURNAL CLUB meets weekly, for the purpose of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.
Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.
Jahresberichte über die Fortschritte der Anatomie und Physiologie (1873). Complete.
Jahresberichte über die Fortschritte der Reinen Pharmaceutischen und Technischen Chemie, etc., 1847-1887.
Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.
Royal Society Catalogue of Scientific Papers, complete.

To the above may be added the four following taken by the Green Library, and accessible to students, viz.:

Centralblatt für die Medicinischen Wissenchaften, complete.
Morphologisches Jahrbuch, complete.
Monatsschrift, International, für Anatomie und Histologie.
Schmit's Jahrbücher der in-und ausländischen gesammten Medicin.

---

Abhandlungen der math.-phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.
Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesell schaft der Wissenchaften. Leipzig, 1852-88.
American Journal of Physiology, complete.
American Journal of Science.

American Naturalist, 1888 to date.
Alienist and Neurologist, 1890 to date.
Annales de l'Institut Pasteur. Vols. 3-5.
Arbeiten a. d. physiologischen Institut Tübingen.
Archiv für Anatomie und Physiologie (1796), complete.
Archiv für Anatomie und Entwickelungsgeschichte, His and Braune, complete.
Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete.
Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).
Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889 to date.
Archiv für Mikroscopische Anatomie. (Complete set in Green Library.)
Archives de Biologie, 1889 to date.
Archives Italiennes de Biologie. (Complete set in Green Library.)
Archives de Neurologie, 1890 to date.
Archives de Physiologie Normale et Pathologique, 1889 to date.
Archives de Zoölogie Expérimentale et Générale.
Beiträge zur Anatomie und Physiologie von Eckard, 1858–88.
Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886 to date.
Berichte über die Leistungen in der Naturgeschichte der Niederen Thiere, 1848–53, 57–60, 61–65, 66–69, 70–71, 72–75, 76–79.
Bibliotheca Zoölogica; Taschenberg Lieferungen. 1866+.
Claus Arbeiten aus dem zoölogischen Institut der Universität Wien und der zoölogischen Station in Trieste, 1878.
Deutsche Zeitschrift für Nervenheilkunde, 1891 to date.
Internationale Monatsschrift für Anatomie und Physiologie, 1889 to date.
Johns Hopkins Hospital Bulletins, 1890 to date.
Journal de l'Anatomie et de la Physiologie, 1889 to date.
Journal of the Coll. of Science, Imperial University of Japan, to date.
Journal of the Marine Biological Association of the United Kingdom. Vols. I–III.
Journal of Comparative Neurology, 1891 to date.

Journal of Experimental Medicine, complete.
Journal of Morphology, complete.
Journal of Nervous and Mental Disease, 1890 to date.
Journal of Physiology, complete.
Journal of the Royal Microscopical Society, 1878–96.
Laboratoire d'Histologie du Collége de France, Années 1874, 83–88.
Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k p. Ak. d. Wissen zu Berlin, 1882–93.
Mind, complete.
Mittheilungen aus der Zoölogischen Station zu Neapel, 1879–88. Vols. I–IX.
Nature, complete.
Froriep, Notizen, 1822–36, in 50 parts; 1837–46, in 40 parts.
Pflüger's Archiv für die Gesammte Physiologie, complete.
Philosophical Society of Cambridge, Transactions, complete.
Philosophical Transactions of the Royal Society, London (1665), complete with indexes.
Popular Science Monthly, complete.
Proceedings of the Cambridge Philosophisal Society (1843) Complete.
Proceedings of the Royal Society of London (1800). Complete.
Quarterly Journal of Microscopical Science, 1889–93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenger. Complete.
Revue Scientifique, 1889 to date.
Revue de Médecine. Vol. IX to date.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884 to date.
Verhanlungen der physiologischen Gesellschaft zu Berlin, 1886 to date.
Zeitschrift für Biologie, 1889 to date.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche Medicin, 1888 to date.

Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Complete.

Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.

Zoölogical Record, 1864 to date. Complete.

Zeitschrift für wissenschaftliche Mikroskopie, 1889 to date.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

## V.

## PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes, with a good general background of Biology. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory, Attention, Association, Will, Feelings, etc. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Comparative and genetic psychology. Observation and experiments upon the mental processes of lower animals, including both microscopical and larger forms, and especially (when practical) the observation of dawning intelligence during animal infancy; questions of Instinct and Psychical Heredity; and in general the parts of the general field common to biology and psychology. See announcements of Dr. Hall and Dr. Sanford.

IV. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies, and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias, neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic.

V. Anthropological psychology; Myths, Custom and Belief, Comparative Religion and Psychology of Religion, Primitive

Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

VI. Æsthetics and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VII. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses.

VIII. Applications of psychology, pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sex problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

The Psychological Laboratory consists of a suite of five rooms on the second floor of the main building (one large and four small), together with another on the third floor. The large room is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, the third as a battery room, and the fourth as a store room for apparatus. The large room on the third floor is used for comparative psychology.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measurements. Many pieces have been manufactured at the University and a considerable number have been designed here for special researches. The collection is constantly

increasing by purchase or construction, especially in apparatus for research.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and especially in their current literature. The collection on Criminology and related topics is also full. The following Journals are on file at the University:

Archiv für Systematische Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosophy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophische Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Sperimentale di Freniatria e di Medicina Legale. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Besides these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. American Journal of Physiology. Journal of Experimental Medicine. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1900–1901 the following courses will be given:

DR. HALL'S COURSES.

Dr. G. Stanley Hall will offer the following courses:

I. HISTORY OF PHILOSOPHY.

II. GENETIC AND COMPARATIVE PSYCHOLOGY.

In this course the effort will be made to sum up the results of the study of children with a digest of all important literature from the prenatal period up to the close of adolescence. These results will be compared with the studies of instinct. The main topics of psychology, such as the senses, memory, imagination, attention, apperception, association, will and feeling, and also the leading topics of morbid psychology, will be treated with special genetic reference. Finally, the history of philosophy and ethical, logical and æsthetic theories will be briefly surveyed for genetic factors. This course is an entirely new effort in an as yet imperfectly explored field.

III. THE HISTORY OF EDUCATION.

From savagery to modern times. With a concise account of the educational theorists and reformers from Plato down. (See fuller statement under Education.)

IV. PSYCHOLOGICAL SEMINARY.

Weekly from seven to ten. Evenings, at the house of the President. Formerly some author—Kant, Hegel, Plato, Aristotle, Spinoza, Spencer, Darwin Schopenhauer—has been read and digested with discussions, but recently the time has been almost exclusively devoted to reports by fellows and students of their theses and other researches for the benefit of mutual criticism and discussion. The latter method will probably continue during the year 1900–1901.

STUDENTS' LECTURE COURSES. All students in the *Psychological Department* are expected to give one or more lectures, open to members of the University, upon topics to which they have given chief attention during the year. These courses have been both valuable and attractive.

All students in this and the Educational Department are expected to select early in the year, after conference with instructors, who will suggest and advise, some topic of research upon which special work shall be done during the year, with a view to obtaining results to be submitted for publication by the end of June. (See Report on Philosophy in the volume published by the University to commemorate the close of the decennial year. July, 1899, pp. 177–185.)

DR. SANFORD'S COURSES.

A. EXPERIMENTAL AND COMPARATIVE PSYCHOLOGY. This course will consist of the following:

1. *Psychological Practicum.* Laboratory Practice and Demonstrations with Informal Lectures on Methods, Apparatus, and Results. The aim here is to familiarize the student with the most important kinds of psychological experimentation and to give him a certain facility in handling ordinary apparatus. The experiments upon the senses are selected from Dr. Sanford's "Course in Experimental Psychology;" those upon the time relations of mental phenomena, fatigue, and circulation and respiration are of a similar character. Four hours a week from October to April.

2. *Comparative Psychology.* Microscopic Forms, Ants, Fish, Chick, White Rat and Kitten, will be observed and subjected to simple experiments. Four hours a week from April to the end of the year.

Both these courses will be given by qualified assistants under the immediate supervision and with the co-operation of Dr. Sanford.

B. GENERAL PSYCHOLOGY. This course is intended primarily for students of Pedagogy and others desiring a general and elementary account of the subject. Text book, lectures and demonstrations. One hour a week throughout the year.

C. ADVANCED PSYCHOLOGY.

1. *Psychological Seminary.* Short lecture courses on special

topics; critical reading of recent literature; and discussion of topics of current psychological interest; preparation of lectures by the students with criticisms by the instructor and others. The work in the Seminary is somewhat informal and is varied to suit the needs of those attending it. One to two hours a week throughout the year.

2. *Original Research.* Advanced students are directed in their work by Dr. Sanford in co-operation with Dr. Hall and Dr. Burnham. The laboratories are open for advanced work at times suited to the convenience of those engaged in it.

## Course in Psychiatry.

Dr. Adolf Meyer's course covers the following ground:

As no provisions are made for a complete course of psychopathology, there will be at least a few afternoons at the Worcester Insane Hospital devoted to a discussion and illustration of some of the most important problems:

1. The data of psycho-physical parallelism.
2. The concepts of constitutional peculiarity, disease-process and disease-entity, residual, etc., and the relation of the elementary symptoms and symptom-complexes to disease-entities.
3. The principal disease types recognized by the various schools.
4. The relation of psychiatry to medicine, to psychology and to sociology.

## Anthropology.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be taken up:

A. General, embracing: (a) History, scope and relations of the science of Anthropology. (b) Physical Anthropology. Problems, investigations, results, laboratory work. (c) Ethnography. Races and race-origins. (d) Ethnology, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religions. (e) Linguistics. Race and language. Origin and development of language and of languages. Psychology of language. Gesture-speech and written language.

Comparative linguistics. Comparative literature. (f) CRIMINAL AND PATHOLOGICAL ANTHROPOLOGY. Ethnic Morals. (g) HISTORICAL AND ARCHÆOLOGICAL. Primitive Man and Primitive Culture.

B. SPECIAL COURSES upon anthropological topics most akin to Psychology and Pedagogy, embodying the results of the most recent and important studies and investigations: The Physical Anthropology of Infancy, Childhood, Youth, Manhood, Old Age; The Anthropological Phenomena of Growth, Arrested Development, Degeneration; Anthropological Aspects of Heredity and Environment in the Individual and in the Race; Uncivilized Races and Civilized Races; The Evolution Problems of Humanity; Education among Primitive Peoples.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University, and every effort will be made to utilize the latest results of Anthropological investigations.

From time to time, the most important current literature will be reviewed and students made acquainted with the best contributions to anthropological science in the various foreign languages. The importance of a thorough acquaintance with the Bibliography of their subjects is impressed upon all students, and all possible assistance in this direction is always at their disposal.

## VI.

## EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of men:

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects:

I. (a) Child Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) Typical Schools and Special Foundations. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

The aims, methods and work of the department have

been described in the report of the Decennial celebration of the University, July, 1899 (pp. 161-176).

The courses in Education for 1899-1900 will be as follows:

DR. BURNHAM'S COURSES.

A. SCHOOL HYGIENE. The fundamental principles of hygiene in regard to school buildings, heating and ventilation, lighting, school furniture, playgrounds, etc. Mental hygiene and the hygiene of instruction. The laws of nervous activity in relation to problems of instruction. Fatigue. The period of study. The hygiene of the kindergarten. The hygiene of reading, writing, arithmetic, manual training, etc. Scientific tests of mental and physical ability. School diseases, defects of sight, hearing, etc. One hour a week throughout the year.

B. THE TEACHING PROFESSION. The school-master in history. The priest as teacher. The evolution of teaching as a profession. The training of teachers in different countries and by different systems. The essentials of pedagogical training, especially for teachers in secondary schools. The relation of the teacher to the community, etc. One hour a week, half a year.

C. PEDAGOGICAL PROBLEMS. The discussion of important problems in the history, philosophy, organization and administration of education. The field of scientific study in education, special topics and problems in school hygiene, child study and educational psychology. The political and social aspects of educational questions and movements. Once a week, half a year.

D. CONFERENCE, once a week. The work will be determined in part by the needs of the individual students. It is hoped that each student will select, after consultation with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

DR. G. STANLEY HALL'S COURSE.

*Education.* The history of education from savagery and the earliest times to the present. This course will begin with the educational ideas and practices of primitive people, the oriental

nations, Greeks, and Romans, and trace the development of education through the middle ages and modern times. The chief writers, institutions, and systems will be characterized with especial reference to the application of philosophy and psychology to pedagogy and to the future improvement and idealization of schools and their work from the kindergarten to the university.

One hour weekly, Saturday mornings.

This and Dr. Burnham's Saturday work constitute a teachers' course open to those not members of the University.

The courses as announced above may be modified somewhat as the needs of the students or other circumstances may require.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*
4. *General Surveys* and Reports on the Present Condition of Education.
5. *Standard Writers* on Education and *Biographies.*
6. *Educational Psychology.*
7. *General Works on the Theory of Education.*
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene.*
10. *The Study of Children, the Kindergarten,* etc.

*11. The State and Laws.* Civic Education, Administration, and School Organization.

*12. Industrial and Technical Education.*

*13. Miscellaneous.*

*14. School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).

*15. Education of Defectives.*

*16. Art Education*, including Museums, etc.

*17. The Training of Teachers;* Examinations, etc.

*18. Moral Education* and School Discipline.

*19. University Education.*

*20. The Learned Professions.*

*21. Special Topics.*

*22. Special Reports of the Bureau of Education.*

*23. Miscellaneous Periodicals.*

*24. Periodicals.*

*25. Miscellaneous Reports;* a, American; b, English; c, French; d, German, etc.

*26. Text-books;* a, Mathematics; b, Science; c, Drawing, etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous i, History.

*27. Old Text-books*, with same sub-divisions as above.

*28. State and City Reports*, sub-divided by States.

*29. Charts, Maps, Pictures*, etc.

*30. Religious Education.*

*31. Nature Study.*

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society and its valuable historical material are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed, which contains a valuable collection of EDUCATIONAL APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

### SPECIAL STUDENTS IN EDUCATION.

In addition to the members of the University special students are admitted during the year, to the Saturday courses of Drs. Hall and Burnham in Education, for a fee of $25.

# LIBRARY.

The University Library contains about 17,500 bound volumes and 1,500 pamphlets, and the reading-room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

A Works of General Reference.
B Journals.
C Mathematics.
D Physics.
E Chemistry.
F Zoölogy.
G Physiology.
H Pathology.
I Psychology.
J Philosophy.
K Ethics.
L Criminology.
M Anthropology.
N Education.
O Botany.

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of Magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found:

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time; and by the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

## LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading-room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department; and these shall be placed by themselves and marked "reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken out on Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias, and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

# BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care and that of the authorities of the University shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty the Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations, but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts in behalf of the University without authority, the officer

or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and co-operation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified, and held for that purpose.

## REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible orders for only the kind and amount of apparatus certain to be used during the year shall be placed; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year.

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

## PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of the University on October 2nd, 1889.

III. Register and Second Official Announcement, May, 1890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the first statement of the plan, aims, and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University; pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth Official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

XIV. Summer School Programme (July 13 to 25, 1896).

XV. Register and Eighth Official Announcement, April, 1896.

XVI. Summer School Programme (July 19 to 31, 1897).

XVII. Register and Ninth Official Announcement, April, 1897.

XVIII. Summer School Programme (July 13 to 27, 1898).

XIX. Register and Tenth Official Announcement, April, 1898.

XX. Summer School Programme (July 13 to 26, 1899), April, 1899.

XXI. Register and Eleventh Official Announcement, April, 1899.

XXII. Clark University, 1889–1899. Decennial Celebration. 8 x 11 in. pp. 566. Published for the University. Price $5.00. Contains the lectures delivered by Professors Picard, Boltzmann, Cajal, Mosso and Forel at the decennial celebration, July, 1899; also reports by the heads of departments on their aims and ideals, with a list of past and present members of the University and the titles of their published papers.

## JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

The American Journal of Psychology. This Journal was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford, and E. B. Titchener (Cornell University) with the assistance of an international board of co-operators. Each volume contains four numbers of about 150 pages each. Besides original articles, a considerable portion of its space is devoted to careful digests of the important literature in its field. Price, $5 per volume; single numbers, $1.50. Louis N. Wilson, Publisher, Worcester, Mass.

The Pedagogical Seminary. This Journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 4, 5 and 6, $5 each. Price of earlier Vols. on application. Louis N. Wilson, Publisher, Worcester, Mass.

The Mathematical Review. This Journal, of which the first volume is in course of publication, is edited by William E. Story. Its scope includes original research in mathematics, résumés of subjects of a more elementary character, pedagogical and historical sketches and bibliographical notices. Every volume will consist of six numbers of 96 pages each. Each number contains the portrait of some distinguished mathematician. Price, $5 a volume. Published by the editor, Worcester, Mass.

UNIVERSITY OF ILLINOIS-URBANA
3 0112 111481906